



# National Oceanic and Atmospheric Administration

## Mission Statement

The National Oceanic and Atmospheric Administration's (NOAA's) mission is to describe and predict changes in the Earth's environment, and conserve and manage wisely the nation's coastal and marine resources so as to ensure sustainable economic opportunities.

NOAA is a future minded environmental science agency whose mission is to describe and predict changes in the Earth's environment and conserve and manage the U.S.'s coastal and marine resources to ensure sustainable economic opportunities. Known as the oceans and atmosphere agency, NOAA is also an Earth sciences and space agency. The FY 2004 request reaffirms NOAA's role by providing resources to maintain essential service, facilitate progress in key investment areas of national interest, and address statutory obligations.

Understanding ocean and atmosphere is essential to sustaining the United States' environmental and economic health. As an agency, NOAA provides products that form a critical part of the daily decisions made across the U.S. From satellite imagery to tornado warning, navigational charts to fishery stock assessments, hurricane tracking to El Niño and harmful algal bloom predictions, severe weather forecasts to coastal zone management—every day NOAA's science, service, and stewardship are essential to the lives of millions of people in the U.S. For example, lives, safety, and businesses depend on reliable weather and climate forecasts to minimize any disruption in economic activity and everyday life. Accurate predictions of severe weather safeguard both lives and economic structure of communities. A deeper understanding of long-term climate and environmental trends can impact daily activities from the strategic planting of crops to better management of water and energy resources. Coastal communities, representing over 30 percent of the U.S. gross domestic product, depend heavily on sustaining healthy marine habitats and a robust ocean ecosystem. With effective partnerships among governments, universities, non-governmental organizations, and communities, NOAA helps to manage the critical issues along the U.S. coasts and the Great Lakes. A healthy coastal environment is intrinsic to the U.S.'s economic prosperity.

On September 11, 2001, the U.S. experienced unprecedented attacks on the World Trade Center and the Pentagon. NOAA responded to the attacks rapidly and with focused support through its agency-wide Incident Response Plan. NOAA was able to deploy critical assets, capabilities, and expertise immediately to support response and recovery efforts. NOAA personnel in weather offices, satellite and remote-sensing teams, hazardous materials units, marine transportation and geodesy offices, and fisheries enforcement teams provided a range of products and services to assist first responders in dealing with this tragedy. The September 11 attacks altered the context of NOAA's incident response planning by providing the impetus to reexamine all of NOAA's response capabilities and improve internal safety and preparedness.

To coordinate the diverse functions needed for this effort, NOAA has established a Homeland Security Coordination Team that includes representatives from across the organization. NOAA is striving to develop the capacity to support federal and state partners and local communities and will respond to the evolving needs of the Office of Homeland Security. NOAA will continue to protect property, serve as environmental stewards, and most important, save lives.

## Priorities/Management Challenges

In FY 2002, a task force comprised of NOAA senior managers and staff was formed to take a bottom-up review of NOAA's organization, operation, and resource utilization. The mandate of the Program Review Team (PRT) was to respond to three central questions:

- Is NOAA's organization aligned with its current missions, now and for the future?
- Are NOAA's resources properly aligned with requirements?
- Is NOAA doing things as efficiently as possible?

The review is expected to not only develop answers and positions on the larger issues of NOAA's requirements and structure, but to improve NOAA's business processes like grant management and facilities planning and capital improvement. This review is also expected to assist in refining the NOAA Strategic Plan for the next decade.

NOAA, as described by the recommendations developed by the PRT, reflects a dynamic organization that builds upon current programs and talents while embracing the central themes of the President's Management Agenda: an organization that is citizen-centered, results-oriented and market-based. The future mission statement will build on NOAA's current programs and talents in order to remain the premier oceanic and atmospheric science, service, and stewardship agency for the U.S. NOAA will carry out these missions innovatively in partnership with other nations; other federal, state, and local agencies; the private sector; and academia.

Regarding the FY 2004 budget request, NOAA will continue to focus on its core responsibilities. Specifically, the budget request will continue NOAA's effort to provide ever increasingly accurate predictions of severe weather; to provide a deeper understanding of long-term climate and environmental trends that can impact daily lives; sustain healthy marine habitats, robust ecosystems and coastal environments; and address safety and environmental compliance issues impacting NOAA's number one resource—its people.

Moreover, the development of the FY 2004 budget was driven by the emphasis of six major cross-cutting themes. The thematic development of NOAA's budget underscores the inter-relationship of many of NOAA's programs that cut across product and service lines. They also underscore the importance of addressing critical environmental issues in a multi-disciplinary manner. The following is a brief summary of the theme's major highlights and performance factors.

### ***Infrastructure, Maintenance, Safety, & Human Capital***

This theme focuses on current infrastructure requirements; health, safety, and security-related activities; ensuring that ships and aircraft are available and can support NOAA's missions; workforce planning and analysis; employee training and retooling; and base resources for employees that provide direction and support to other line offices.

Critical performance factors include a 38 percent reduction of NOAA's facility maintenance and repair backlog in FY 2004. Upgrades to NOAA's aircraft will enable them to meet Federal Aviation Administration and International and Civil Aviation organization regulatory and safety requirements necessary for the aircraft to continue their support of NOAA programs. Replacement of the World Weather Building will enable NOAA personnel to move out of an obsolete space by FY 2008. Finally, the acceleration of facility modernization efforts in Alaska will be completed in FY 2008.

### ***Homeland Security***

As the U.S.'s top priority, this theme focuses on the further refinement as well as development of NOAA's contributions to the national homeland security effort. The budget supports a scaled upgrade of the current NOAA Weather Radio (NWR) operation to be capable of standardizing and automating receipt and disseminating non-weather emergency messages.

### ***Climate Change, Research, Observations & Services***

This theme emphasizes integration of NOAA's observation systems inclusive of both ocean and Earth-based (ground) observations; development of common standards for integrating weather-climate models; and requirements of the President's Climate Change Research Initiative.

Critical performance factors include implementing a global ocean observing system for climate to facilitate in producing a prototype carbon map of the oceans in FY 2005. Extensive work will be conducted to continue to inventory and model carbon sources and sinks over the contiguous United States. NOAA will lay the foundation for the next generation of carbon cycle observing system—regional scale estimate of carbon sources and sinks over North America by adding more sites and producing the first experimental carbon map in FY 2006.

### ***Ecosystem Forecasting and Management***

Among others, this theme focuses on assessing, monitoring, and characterizing the physical, chemical, and biological components of ocean and coastal ecosystems; developing information on how these environmental factors will impact ocean and coastal species and their habitats; conserving living marine resources and their habitats; rebuilding fishery resources; and recovering protected species.

Critical performance factors associated with the FY 2004 budget include reducing the number of overfished major stocks for which the status is known (from the year 2000 baseline) from forty-three stocks in 2004 to nearly 30 percent less (thirty-one stocks) in 2008; reducing the number of major fish stocks with an "unknown" status (115 stocks in 2004) to no more than ninety-three stocks in 2008, a 20 percent reduction; and reducing the level of bycatch in monitored fisheries in 2004 by 30 percent in 2008.

### ***Energy and Commerce***

This theme builds on the political imperative already developed for NOAA's role in energy, and examines the next steps toward implementing those objectives and activities required to upgrade the U.S.'s Marine Transportation System (MTS).

Critical performance factors include improved air quality forecasts of ozone and other air pollutants from thirty-six hours to five days by building on the information gathered from the FY 2002 Air Quality Study. For commerce, it establishes 100 new electronic nautical charts and supports new infrastructure for integrating electronic, raster, and paper data information. The request supports producing a new forecast model system that provides under keel clearance information to make port transit more efficient, reduce fuel consumption, and reduce water pollution.

### ***Environmental Monitoring and Prediction***

This theme focuses on collecting data in order to monitor the environment's climate and weather patterns. Monitoring and dissemination of the data will serve as a tool to facilitate the decision making process on management and forecasting. The theme also focuses on expanding the use of data collection platforms (aircraft, observing systems, satellites) in order to increase and improve forecast data resulting in improved performance.

The performance accomplishments include doubling of forecast improvements e.g. a forty-eight-hour forecast will be as good as the current twenty-four-hour forecast within ten years, and predictability will be extended from seven days to fourteen days. Infusion and acceleration of NEXRAD planned product improvement by one to two years will result in increased tornado detection accuracy from 68 percent to 75 percent and improve tornado warning lead time from eleven minutes to fourteen minutes by FY 2007.

NOAA, through its five line offices and two supporting service line offices, has established itself as one of the world's premier scientific and environmental agencies. The demand for NOAA products and services is expected to increase significantly over the next few years. The FY 2004 budget submission strengthens NOAA's ability to respond to those demands and positions NOAA to address and provide assistance to national issues such as homeland security and climate change.

## FY 2004 Program Changes

*(Dollars in Thousands)*

### *National Ocean Service (NOS)*

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Navigation services	606	\$121,555	0	+\$6,500

An increase is requested to research, develop, and implement new oceanographic models for key ports (0 FTE; +\$1,000) and to maintain the existing suite of Electronic Navigation Charts and expand the suite by 100 (0 FTE; +\$2,000). An increase is requested to extend the use of a vessel lease or time charter for hydrographic surveying in the Gulf of Mexico and Alaska (0 FTE; +\$2,000). An increase is also requested to repair the degraded National Water Level Observation Network and begin to upgrade the network with real-time capabilities (0 FTE; +\$1,500).

### *National Marine Fisheries Service (NMFS)*

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Fisheries research and management services	1,805	\$351,988	0	+\$11,020

Increases are requested to further the understanding of the effects of climate change on marine and coastal ecosystems (0 FTE; +\$2,000); to reduce bycatch in seven targeted fisheries (0 FTE; +\$2,800); to modernize and expand annual stock assessments (0 FTE; +\$3,000); to continue expansion of a multi-year comprehensive social sciences program within NMFS (0 FTE; +\$220); to continue building a national observer program for the collection of high quality fisheries and environmental data to assess impacts on marine resources and fishing communities, particularly in the New England Groundfish fishery (0 FTE; +\$3,000); and to streamline the current fisheries regulatory process (0 FTE; +\$1,500). A reduction is requested for the Science and Technology base line item (0 FTE; -\$1,500).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Protected resources research and management services	644	\$155,640	+10	+\$5,100

Increased resources are requested to further implement the Columbia River system biological opinion (0 FTE; +\$3,100) and to perform an increased number of Section 7 consultations (+10 FTE; +\$2,000).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Enforcement and surveillance services	229	\$50,948	0	-\$250

A decrease is requested for a fisheries enforcement vessel in New Hampshire, which was a one-time project.

***Oceanic and Atmospheric Research (OAR)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Climate research	360	\$171,382	+8	+\$13,400

An increase is requested for the President’s multi-agency Climate Change Research Initiative (+8 FTE; +\$13,400).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Weather and air quality research	256	\$58,208	-8	-\$1,650

Increases are requested for the U.S. Weather Research Program for: the Administration’s Energy Security Program (0 FTE; +\$1,200); and for THORPEX (0 FTE; +1,300).

An offset is requested for the FSL Wind Profiler (-8 FTE; -\$4,150).

***Oceanic and Atmospheric Research (OAR)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Ocean, coastal, and Great Lakes research	144	\$53,816	+23	+\$58,400

Increases are requested to reflect the transfer of the National Sea Grant College Program which was requested in the National Science Foundation budget for FY 2003 (+23 FTE; +\$57,400); and for NISA/Prevent and Control Invasive Species (0 FTE; +\$1,000).

***National Weather Service (NWS)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Operations and research (O&R)	4,393	\$625,700	-43	+4,050

Increases are requested for the following: to restore funding for the Susquehanna River Basin Flood System (0 FTE; +\$1,300); to continue Pacific Islands Weather Observation support (0 FTE; +\$3,550); and to support improved weather office facilities physical security (0 FTE; +\$2,200).

A decrease is requested in the Local Warnings and Forecast Base to reflect workforce savings resulting from the completion of Weather Service Modernization (-43 FTE; -\$3,000).

***Program Support***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Corporate services	162	\$87,906	+0	+\$6,000

An increase is requested for the Under Secretary and Associate Offices to maintain a minimum level of funding necessary to provide centralized executive management (0 FTE; +\$2,000); for program planning and integration (0 FTE; +\$1,000); and for Government-wide e-government initiatives in combination with other Departmental funding (0 FTE; +\$3,000).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Facilities	15	\$24,500	0	+\$5,000

An increase is requested for the following activities: a multi-year plan to eliminate the current maintenance backlog at various NOAA facilities (0 FTE; +\$3,000); and for environmental compliance at NOAA facilities (0 FTE; +2,000).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Marine and aviation operations	910	\$104,414	+8	+\$4,722

All costs of on-going maintenance, minor repairs, and planning for future fleet modernization and replacement efforts are accounted for in this subactivity. Expenditures for future fleet modernization activities are accounted for in the Procurement, Acquisition and Construction (PAC) account.

Increased funding is requested for increased NOAA Corps strength and for standards of training (+8 FTE; +\$1,000); for operations and maintenance on the NOAA ship FAIRWEATHER (0 FTE; +\$1,950); and for aviation operations to cover maintenance on the Gulfstream IV airplane, routine maintenance on aircraft scientific instruments, general maintenance, and for crew training and documentation to meet FAA requirements (0 FTE; +\$1,772).

***Procurement, Acquisition and Construction (PAC)***

The PAC account captures the cost of acquiring and improving capital assets used by NOAA in carrying out its varied missions. This account is grouped by line office into three common activities: “Systems Acquisition” which contains projects associated with modernizing NOAA’s weather and climate programs, including satellite procurement; “Construction” which contains projects involving new construction, or major modification of existing facilities; and “Fleet and Aircraft Replacement” which contains funding to support modernization of NOAA’s fleet of ships and aircraft either through new construction, major modification to existing assets, or long term acquisition of capacity from third parties.

***National Ocean Service (NOS)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Construction	0	\$20,012	0	-\$12

A minimal decrease in funding is requested for the National Estuarine Research Reserve System (NERRS) construction and land acquisition needs and opportunities for partnership (0 FTE; -\$12).

***National Marine Fisheries Service (NMFS)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Construction	0	\$17,000	0	-\$3,000

The budget continues support for construction of a new Honolulu fisheries laboratory including possible consolidation with a new Pacific Islands Regional Office (0 FTE; -\$3,000).

***Oceanic and Atmospheric Research (OAR)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Systems acquisition	0	\$10,584	0	+\$3,500

Increased funding is required at the Geophysical Fluids Dynamics Laboratory (GFDL) to maintain a multi-year acquisition for a state-of-the-art high performance computing system associated with the Climate Change Research Initiative (0 FTE; +\$3,500).

***National Weather Service (NWS)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Systems acquisition	54	\$64,946	0	+\$10,105

Increased funding is required to accelerate NEXRAD Product Improvements to increase lead time warnings for severe storms (0 FTE; +\$3,740); to replace the equipment of the NWS Telecommunications Gateway to increase its capacity and reliability (0 FTE; +\$2,870); to begin implementing an integrated NWS Coastal Global Observing System (0 FTE; +\$2,000); and to develop an All Hazards NOAA Weather Radio Warning Network (0 FTE; +\$5,500).

Decreased funding is requested for Advanced Weather Interactive Processing System (AWIPS) with the completion of Build 5.0 (0 FTE; -\$2,130); and a decrease is proposed for the NWS Weather and Climate Supercomputing to capture savings as the project moves from acquisition of new equipment to steady state (0 FTE; -\$1,875).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Construction	0	\$10,630	0	+\$13,400

This activity funds renovation and replacement of weather forecast offices in the continental U.S., Alaska and the Pacific Islands.

Increased funding is requested to accelerate Weather Forecast Office Construction to renovate and replace substandard housing and offices (0 FTE; +\$3,000); and to fund above standard lease costs for a NOAA Science Center which will replace the inadequate World Weather Building (0 FTE; +\$10,400).

***National Environmental Satellite, Data and Information Service (NESDIS)***

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Systems acquisition	94	\$598,736	0	+\$75,701

Increased funding is requested to continue the tri-agency acquisition of the next generation polar-orbiting satellites (NPOESS) (0 FTE; +\$31,545); and to fund systems design and development for the GOES R geostationary satellite series (0 FTE; +\$50,156).

Decreased funding is requested reflecting the non-recurring development of a Coastal Remote Sensing Imager (0 FTE; -\$6,000).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Construction	0	\$13,440	0	-\$673

A decrease is requested for the Suitland satellite operations command and control center as this project nears completion (0 FTE; -\$673).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Fleet replacement	0	\$54,059	0	-\$54,059

Reduced funding is requested for major repair of the WHITING hydrographic survey vessel (0 FTE; -\$3,185) and for acquisition and for delaying the option on the third Fisheries Research Vessel (FRV) (0 FTE; -\$50,874).

	Base		Increase/Decrease	
	FTE	Amount	FTE	Amount
Aircraft replacement	0	\$8,400	0	+\$738

Increased funding is requested for required regulatory upgrades to aircraft (0 FTE; +\$1,343); to replace the aging airframe for the Turbo Commander (0 FTE; +\$1,550); and for navigation upgrades on both WP-3D aircraft (0 FTE; +\$1,645).

Reduced funding is requested to upgrade the instrumentation on the Gulfstream IV hurricane surveillance aircraft to improve storm-tracking forecasts (0 FTE; -\$3,800).

# Targets and Performance Summary

See individual Performance Goal sections for further description of each measure

<b>Performance Goal 1: Build Sustainable Fisheries</b>							
Measure	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Number of overfished major stocks of fish	New	56	46	45	Available in the FY 2005 plan and FY 2003 report.	43	42
Number of major stocks with an "unknown" stock status	New	120	120	120	Available in the FY 2005 plan and FY 2003 report.	118	115
Percentage of plans to rebuild overfished major stocks to sustainable levels	New	93%	93%	94%	Available in the FY 2005 plan and FY 2003 report.	96%	97%

<b>Performance Goal 2: Sustain Healthy Coasts</b>							
Measure	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Number of acres of coastal habitat benefited (cumulative)	New	New	83,002	108,531	108,531	117,884	120,532
Introductions and effects of invasive species in a total of six regions within the United States	0	1	2	2	2	2	2
Percentage of U.S. shoreline and inland areas that have improved ability to reduce coastal hazard impacts	5%	6%	8%	15%	8%	17%	17%

<b>Performance Goal 3: Recover Protected Species</b>							
Measure (new for FY 2003)	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Increase in number of threatened species with lowered risk of extinction	New	New	2	2	Available in the FY 2005 plan and FY 2003 report.	5	5
Number of commercial fisheries that have insignificant marine mammal mortality	New	New	2	6	Available in the FY 2005 plan and FY 2003 report.	6	6
Increase in number of endangered species with lowered risk of extinction	New	New	3	6	Available in the FY 2005 plan and FY 2003 report.	6	6

**Performance Goal 4: Advance Short-term Warnings and Forecasts**

Measure		FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Lead time (minutes), accuracy (%), and false alarm rate (FAR, %) for severe weather warnings tornadoes	Lead Time	12	10	10	11	12	12	12
	Accuracy	70%	63%	67%	69%	76%	72%	72%
	FAR	73%	76%	73%	71%	73%	72%	70%
Lead time (minutes) and accuracy (%) for severe weather warnings for flash floods	Lead Time	44	43	46	45	52	50	52
	Accuracy	85%	86%	86%	86%	89%	87%	89%
Hurricane forecast track error (48 Hour)	Nautical Miles	New	New	New	142	124	130	129
Accuracy (%) of 1-day threat score forecast for precipitation		New	New	New	New	30%	25%	25%
Lead time (hours) and accuracy (%) for winter storm warnings	Lead Time	11	9	13	13	13	13	14
	Accuracy	85%	85%	90%	86%	89%	88%	89%
Accuracy (%) and FAR (%) of forecasts of ceiling and visibility (½ mile/500 ft.) (aviation forecasts)	Accuracy	New	New	New	New	45%	45%	46%
	FAR	New	New	New	New	71%	71%	70%
Accuracy (%) of forecast for winds and waves (marine forecasts)								
wind speed	Accuracy	New	New	New	New	52%	54%	54%
wave height		New	New	New	New	68%	66%	66%

**Performance Goal 5: Implement Seasonal to Interannual Climate Forecasts**

Measure		FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Determine the accuracy of the correlation between forecasts of the southern oscillation index (SOI) and El Niño/La Niña events		0.85	0.84	0.85	0.85	0.85	0.85	0.86
U.S. temperature—skill score		23.3	27	20	20	18	20	21
Number of new monitoring or forecast products that become operational/year (cumulative)		New	New	4	8	8	12	16
New climate observations introduced		New	New	132	174	192	275	412

**Performance Goal 6: Predict and Assess Decadal to Centennial Climate Change**

Measure	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Assess and model carbon sources and sinks throughout the United States	New	New	New	Establish five new pilot atmospheric profiling sites and four new oceanic carbon tracks.	Identified five new pilot atmospheric profiling sites and four new oceanic carbon tracks.	Reduce uncertainty of atmospheric estimates of U.S. carbon balance to ± 50%.	Improved model-data fusion techniques, reduce uncertainty of atmospheric transport models, incorporate new data.
Assess and model carbon sources and sinks globally	New	New	New	Establish three new global background sites as part of the global flask network.	Establish three new global background sites as part of the global flask network.	Complete a working prototype of a coupled carbon-climate model.	Carbon-climate scenarios developed and available for input to assessment.
Determine actual long-term changes in temperature and precipitation throughout the United States	New	New	New	Capture more than 60% of true contiguous U.S. precipitation trend and capture more than 25% of true contiguous U.S. precipitation trend.	Capture more than 85% of true contiguous U.S. precipitation trend and capture more than 55% of true contiguous U.S. precipitation trend.	Capture more than 70% of true contiguous U.S. temperature trend and capture more than 40% of true contiguous U.S. precipitation trend.	Capture more than 80% of true contiguous U.S. temperature trend and capture more than 55% of true contiguous U.S. precipitation trend.
Results of 90% of the research activities cited in the 2001 Intergovernmental Panel on Climate Change's third assessment of climate change	New	New	New	100% cited	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A <sup>1</sup>

**Performance Goal 7: Promote Safe Navigation**

Measure	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Target	FY 2002 Actual	FY 2003 Target	FY 2004 Target
Hydrographic survey backlog (square nautical miles) for critical navigation areas (cumulative percentage)	20.7%	24.3%	31.2%	35.0%	34.3%	37.9%	44.5%
Percentage of national spatial reference system completed (cumulative)	59%	71%	75%	78%	81%	84%	86%

<sup>1</sup> The Intergovernmental Panel on Climate Change assessments are only published every five years. In off years there are no results to report.

# Resource Requirements Summary

(Dollars in Millions. Funding amounts reflect total obligations.)

## Information Technology (IT)

### Full Time Equivalent (FTE)

<b>Performance Goal 1: Build Sustainable Fisheries</b>								
	<b>FY 1999 Actual</b>	<b>FY 2000 Actual</b>	<b>FY 2001 Actual</b>	<b>FY 2002 Actual</b>	<b>FY 2003 Estimate</b>	<b>FY 2004 Base</b>	<b>Increase/ Decrease</b>	<b>FY 2004 Request</b>
Operations, Research, and Facilities								
National Ocean Service	9.2	9.1	0.0	9.8	9.9	10.0	0.0	10.0
National Marine Fisheries Service	291.4	309.1	439.1	400.4	389.8	403.5	10.8	414.2
NOAA Research	35.1	37.1	93.0	44.0	17.6	18.2	57.4	75.6
Program Support	26.2	21.6	18.7	42.2	45.6	74.6	3.3	77.9
Procurement, Acquisition, and Construction	10.1 <sup>1</sup>	61.8 <sup>1</sup>	—	—	—	—	—	—
National Marine Fisheries Service	—	—	62.5	14.8	15.0	15.0	(3.0)	12.0
Program Support	—	—	3.7	4.8	53.5	51.0	(50.7)	0.4
Other Accounts	32.4 <sup>1</sup>	2.9 <sup>1</sup>	—	—	—	—	—	—
Discretionary— National Marine Fisheries Service	—	—	2.4	0.4	1.1	1.4	0.0	1.4
Mandatory—National Marine Fisheries Service	—	—	6.9	16.4	5.5	5.7	0.0	5.7
Mandatory—Program Support	—	—	3.5	—	—	—	—	—
Total Funding	404.4	441.6	629.8	532.8	538.0	579.4	17.8	597.2
IT Funding <sup>2</sup>	24.5	13.5	17.9	5.2	9.2	9.2	6.4	15.6
FTE	2,330	2,205	2,053	2,158	2,081	2,511	24	2,535

**Performance Goal 2: Sustain Healthy Coasts**

	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Actual	FY 2003 Estimate	FY 2004 Base	Increase/ Decrease	FY 2004 Request
Operations, Research, and Facilities								
National Ocean Service	152.6	165.0	275.8	275.3	246.5	250.0	0.0	250.0
National Marine Fisheries Service	17.1	17.3	23.0	28.4	22.2	23.2	0.0	23.2
NOAA Research	63.2	58.4	28.3	80.0	30.8	31.2	1.0	32.2
National Environmental Satellite, Data, and Information Service	6.2	6.2	4.0	4.8	4.8	4.8	0.0	4.8
Program Support	6.7	7.9	14.9	28.9	29.3	48.2	2.2	50.4
Procurement, Acquisition, and Construction								
National Ocean Service	—	—	53.9	61.7	20.0	20.0	0.0	20.0
NOAA Research	—	—	14.0	0.0	0.0	0.0	0.0	0.0
Program Support	—	—	3.5	3.2	1.8	0.1	0.1	0.2
Other Accounts								
Discretionary—National Ocean Service	—	—	152.9	142.7	0.0	0.0	0.0	0.0
Mandatory—National Ocean Service	—	—	0.0	9.0	1.4	0.0	0.0	0.0
Mandatory—Program Support	—	—	2.6	—	—	—	—	—
Total Funding	260.9	278.6	572.9	634.1	356.7	377.4	3.3	380.7
IT Funding <sup>2</sup>	N/A	2.1	16.2	1.6	1.2	1.2	0.7	1.9
FTE	890	509	1,047	1,144	1,058	978	1	979

**Performance Goal 3: Recover Protected Species**

	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Actual	FY 2003 Estimate	FY 2004 Base	Increase/ Decrease	FY 2004 Request
Operations, Research, and Facilities								
National Ocean Service	0.0	0.3	0.0	2.8	3.0	3.0	0.0	3.0
National Marine Fisheries Service	74.1	90.2	172.0	157.9	175.9	178.4	5.1	183.5
NESDIS	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOAA Research	0.3	0.3	0.0	0.4	0.4	0.4	0.0	0.4
Program Support	3.2	4.6	8.5	21.7	22.8	39.0	1.8	40.9
Procurement, Acquisition, and Construction								
National Marine Fisheries Service	—	—	0.0	0.0	2.0	2.0	0.0	2.0
Program Support	—	—	9.8	5.6	1.6	0.1	0.1	0.2
Other Accounts								
Discretionary—National Marine Fisheries Service	—	58.0 <sup>1</sup>	—	—	—	—	—	—
Mandatory—Program Support	—	—	1.2	—	—	—	—	—
Total Funding	79.4	153.4	301.3	342.5	315.7	333.0	(13.0)	320.0
IT Funding <sup>2</sup>	24.5	7.2	7.0	1.9	3.3	3.3	2.1	5.4
FTE	575	519	813	824	847	798	11	809

**Performance Goal 4: Advance Short-term Warnings and Forecasts**

	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Actual	FY 2003 Estimate	FY 2004 Base	Increase/ Decrease	FY 2004 Request
Operations, Research, and Facilities								
NOAA Research	56.8	61.6	49.7	48.7	55.6	56.6	(1.7)	55.0
National Weather Service	547.8	587.0	629.0	674.1	694.9	715.0	4.1	719.1
NESDIS	54.4	54.0	56.2	73.0	84.2	86.5	0.0	86.5
Program Support	43.9	41.2	49.0	51.6	63.7	152.0	11.8	163.8
Procurement, Acquisition, and Construction								
NOAA Research	—	—	3.0	2.0	0.0	0.0	0.0	0.0
National Weather Service	—	—	63.4	71.9	75.6	75.6	23.5	99.1
NESDIS	—	—	515.0	517.1	609.2	609.2	75.0	684.2
Program Support	—	—	8.5	7.4	16.4	8.9	0.1	8.9
Other Accounts								
Mandatory—Program Support	—	—	2.2	—	—	—	—	—
Total Funding	1,269.4	1,260.9	1,376.0	1,445.9	1,599.4	1,703.7	112.8	1,816.5
IT Funding <sup>2</sup>	160.9	290.3	241.1	210.9	230.7	230.7	44.2	274.9
FTE	6,351	5,812	5,997	5,859	6,091	5,952	(47)	5,905

**Performance Goal 5: Implement Seasonal to Interannual Climate Forecasts**

	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Actual	FY 2003 Estimate	FY 2004 Base	Increase/ Decrease	FY 2004 Request
Operations, Research, and Facilities								
NOAA Research	63.6	70.5	58.5	77.8	74.9	76.0	0.0	76.0
National Weather Service	4.7	4.7	0.4	1.0	1.9	1.9	0.0	1.9
NESDIS	40.0	41.6	61.8	64.2	57.0	58.6	0.0	58.6
Program Support	3.6	4.3	4.0	13.0	13.9	21.8	0.9	22.7
Procurement, Acquisition, and Construction	0.6 <sup>1</sup>	—	—	—	—	—	—	—
Program Support	—	—	0.8	0.8	0.7	0.04	0.06	0.1
Other Accounts	—	—	—	—	—	—	—	—
Mandatory—Program Support	—	—	1.4	—	—	—	—	—
Total Funding	112.5	121.1	126.9	156.8	148.4	158.3	0.9	159.2
IT Funding <sup>2</sup>	20.4	22.8	35.8	42.6	44.8	44.8	3.6	48.4
FTE	549	350	323	399	364	543	0.0	543

**Performance Goal 6: Predict and Assess Decadal to Centennial Change**

	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Actual	FY 2003 Estimate	FY 2004 Base	Increase/ Decrease	FY 2004 Request
Operations, Research, and Facilities								
NOAA Research	67.9	69.2	97.8	95.4	110.8	113.1	13.4	126.5
National Weather Service	8.2	9.7	0.0	0.0	0.0	0.0	0.0	0.0
NESDIS	8.2	6.3	3.0	0.5	0.5	0.5	0.0	0.5
Program Support	5.1	5.2	3.5	12.8	17.5	25.4	0.9	26.3
Procurement, Acquisition, and Construction	0.6 <sup>1</sup>	4.9 <sup>1</sup>	—	—	—	—	—	—
NOAA Research	—	—	6.0	11.6	10.6	10.6	3.5	14.1
NESDIS	—	—	0.0	0.0	3.0	3.0	0.0	3.0
Program Support	—	—	0.7	0.6	0.7	0.0	0.1	0.1
Other Accounts	—	—	—	—	—	—	—	—
Mandatory—Program Support	—	—	0.9	—	—	—	—	—
Total Funding	90.0	95.3	111.9	120.8	143.1	152.7	17.9	170.5
IT Funding <sup>2</sup>	9.6	22.1	18.9	15.8	17.6	17.6	4.4	22.0
FTE	485	127	370	487	469	428	8	436

**Performance Goal 7: Promote Safe Navigation**

	FY 1999 Actual	FY 2000 Actual	FY 2001 Actual	FY 2002 Actual	FY 2003 Estimate	FY 2004 Base	Increase/ Decrease	FY 2004 Request
Operations, Research, and Facilities								
National Ocean Service	92.2	98.4	114.4	118.6	119.1	121.6	6.5	128.1
NOAA Research	0.4	0.4	0.0	0.9	0.9	0.9	0.0	0.9
Program Support	4.9	5.7	5.5	23.7	30.0	38.4	2.9	41.2
Procurement, Acquisition, and Construction								
Program Support	—	—	12.6	15.4	3.9	3.2	(3.1)	0.1
Other Accounts								
Mandatory—Program Support	—	—	3.5	—	—	—	—	—
Total Funding	97.5	104.5	136.0	158.5	153.9	164.0	6.3	170.3
IT Funding <sup>2</sup>	3.9	9.7	22.8	10.3	11.2	11.2	0.5	11.7
FTE	878	807	870	734	878	880	0.0	880

**NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION**

<b>Grand Total</b>	<b>FY 1999 Actual</b>	<b>FY 2000 Actual</b>	<b>FY 2001 Actual</b>	<b>FY 2002 Actual</b>	<b>FY 2003 Estimate</b>	<b>FY 2004 Base</b>	<b>Increase/ Decrease</b>	<b>FY 2004 Request</b>
Operations, Research, and Facilities								
National Ocean Service	254.0	266.3	390.2	406.4	378.5	384.5	6.5	391.0
National Marine Fisheries Service	382.6	416.6	634.1	586.8	587.9	605.1	15.9	621.0
NOAA Research	287.3	297.5	327.3	347.3	290.9	296.4	70.2	366.5
National Weather Service	560.7	601.4	629.4	675.2	696.8	716.9	4.1	721.0
NESDIS	100.6	101.8	125.0	142.5	146.4	150.3	0.0	150.3
Program Support	93.6	90.5	104.1	177.8	205.8	216.8	15.7	232.5
Procurement, Acquisition, and Construction	589.5 <sup>1</sup>	600.1 <sup>1</sup>	—	—	—	—	—	—
National Ocean Service	—	—	53.9	61.7	20.0	20.0	0.0	20.0
National Marine Fisheries Service	—	—	62.5	14.8	17.0	17.0	(3.0)	14.0
NOAA Research	—	—	23.0	13.6	10.6	10.6	3.5	14.1
National Weather Service	—	—	63.4	71.9	75.6	75.6	23.5	99.1
NESDIS	—	—	515.0	517.1	612.2	612.2	75.0	687.2
Program Support	—	—	39.6	37.7	78.6	63.3	53.3	10.0
Other Accounts	36.4 <sup>1</sup>	68.4 <sup>1</sup>	—	—	—	—	—	—
Discretionary								
National Marine Fisheries Service	—	—	112.2	154.4	111.1	111.4	(20.0)	91.4
National Ocean Service	—	—	152.9	142.7	0.0	0.0	0.0	0.0
Mandatory								
National Marine Fisheries Service	—	—	6.9	16.4	5.5	5.7	0.0	5.7
National Ocean Service	—	—	0.0	9.0	1.4	0.0	0.0	0.0
Program Support	—	—	15.3	16.2	17.0	182.5	8.0	190.5
Total Funding	2,304.7	2,442.6	3,254.6	3,391.5	3,255.1	3,468.4	146.0	3,614.4
Direct	2,304.7	2,442.6	3,254.6	3,391.5	3,255.1	3,468.4	146.0	3,620.2
Reimbursable	256.0	290.6	204.0	197.0	219.0	219.0	0.0	219.0
IT Funding <sup>2</sup>	243.8	367.7	408.2	440.1	485.7	485.7	70.1	555.8
FTE	12,058	10,329	11,472	12,330	12,903	12,939	(2)	12,937

<sup>1</sup> For FY 1999 and FY 2000, detailed stewardship portfolio spreads were not available for program support, PAC, and other accounts.

<sup>2</sup> IT funding included in total funding. For FY 2002 – 2004, the total IT dollars include the figures for four additional categories (infrastructure, architecture and planning, grants management, and financial management) which were not included in the total IT dollars for each of the seven strategic planning goals.

**Notes:**

NOAA changed its methodology for allocating support costs by Performance Goal to more accurately reflect the distribution of the budget across performance goal.

Other Accounts/Mandatory/Program Support is a breakout of the CSRS funds.

PAC/Program Support includes the distribution of CAMS.

The differences between FY 1999 IT dollars and FY 2000, FY 2001, and FY 2002 amounts is a result of several factors: (1) In previous years, the amounts accounted for major projects only. We have expanded the definition of IT dollars to include all projects identified in Exhibit 53, NOAA's President's Budget for FY 1999. (2) The FY 1999 amount for performance goal 3, "recover protected species," was in error. This amount was inadvertently duplicated from performance goal 1, "build sustainable fisheries." The appropriate response should have been not applicable. (3) The apparent decrease in dollars for performance goal 1, "build sustainable fisheries," is actually a realignment of the stewardship portfolio.

## Skill Summary

Marine ecologists, environmental educators, land use planners, toxicologists, economists, hydrologists, electronic technicians, hydrometeorological technicians, atmospheric scientists, computer specialists, instrumentation engineers, instrumentation technicians, physicists, mathematicians, electronic engineers, cartographers, photogrammetrists, geodesists, hydrographers, fishery biologists, fishery economists, oceanographers, engineers, chemists, meteorologists, physical scientists, and computer scientists.

## IT Requirements

- National Marine Fisheries Service Fishing Information Technology System.
- Healthy Coasts does not rely on any one IT system.
- National Marine Fisheries Service Fishing Information Technology System.
- Advanced Weather Interactive Processing System, Next Generation Weather Radar System, Geostationary Operational Environmental Satellites Ground System, and Automated Surface Observing System.
- Satellite Active Archive, NOAA Virtual Data System, National Environmental Data Archive and Access System, and Climate Prediction Centers Climate Computer.
- Geophysical Fluid Dynamics Laboratory.
- Nautical Charting and Hydrographic Surveying System, Physical Oceanographic Real-time Systems, and Data Processing and Analysis Subsystem for National Water Level Observation Network, and Geodetic Support System.

# FY 2004 Performance Goals

## Performance Goal 1: Build Sustainable Fisheries

### Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth's environment to promote sustainable growth.

### Rationale for Performance Goal

Billions of dollars in economic growth, thousands of jobs, and countless commercial and recreational fishing opportunities are not realized as a result of overfishing and overcapitalization in commercial and recreational fisheries. While many fisheries are well managed and produce positive benefits, others are severely depleted or overcapitalized and must be restored and managed to realize their long-term potential. Rebuilding and reducing overcapitalization in existing fisheries will promote the economic and biological sustainability of U.S. fishing resources. Building sustainable fisheries will increase greatly the U.S.'s wealth and quality of life.

The basis for the existing suite of performance measures is the sequence of events associated with sustaining or rebuilding fisheries over time. In concept, these events occur in the following order: (1) The first task is to identify if a stock is overfished; the performance measure on stock assessment and reducing the number of unknown stocks addresses this step. (2) Once a stock has been classified as overfished, the NOAA/National Marine Fisheries Service is mandated to create a rebuilding plan by statute; the rebuilding performance measure addresses this outcome. (3) Each rebuilding plan will have a trajectory and timeframe to achieve the rebuilding objective of recovering the stock to sustainable levels; the performance measure describing the number of overfished stocks measures how closely this target and trajectory is being met and other measures for this goal that are important indicator measures of these influences. An additional important area of concern that the National Marine Fisheries Service (NMFS) will address through its performance measures in the future is the issue of bycatch and its effect on fish stocks and protected species. For its FY 2004 budget request, NMFS anticipates initiating a comprehensive bycatch assessment and reduction program. The FY 2004 activities will include an increase in observer days at sea in fisheries thought to have high levels of bycatch and/or inadequate data regarding bycatch; initiation of a program to develop and incorporate new bycatch reduction techniques in at least three fisheries; and development of a bycatch database for use by NMFS, other federal agencies, states, regional councils, and constituents. Beginning in FY 2005, NMFS will begin measuring its success in reducing bycatch in fisheries toward its ultimate goal of reducing the level of bycatch in all fisheries.

### Changes to the Performance Measures

For FY 2004, NMFS will continue to primarily use the existing performance measures for this strategic planning goal. However, NMFS is currently making improvements on its performance measures to better reflect the Agency's challenging responsibilities and performance in managing the living marine resources of the U.S. New performance measures will be considered carefully during the development of a new NMFS strategic plan slated for completion in the spring of 2003.

To assist NMFS, a workshop was held in June 2002 to solicit input from fisheries stakeholders and map a new path for fisheries management performance. Among the input, the workshop participants recommended three new focus areas for performance measures that could potentially be developed into objectives relevant to this strategic planning goal. The three areas are 1) biological sustainability, 2) socio-economic sustainability, and 3) internal administration and process.

**Measure 1a: Number of Overfished Major Stocks of Fish**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	New	New	New	45	43	42
Actual		56	46 <sup>1</sup>	N/A <sup>2</sup>		
Met/Not Met						

<sup>1</sup> Of the 56 listed as overfished in 2000, 10 were later reclassified as not being subject to the overfishing requirements of the Magnuson-Stevens Act.

<sup>2</sup> The FY 2002 Actual for this measure is anticipated in early FY 2003 pending release of the Report to Congress, Status of Fisheries of the United States, 2002. Future targets will be modified as appropriate.

**Explanation of Measure**

The purpose of this measure is to focus on the total number of overfished stocks defined as major stocks for which status is known; major stocks for which status is known is 167. A major stock is defined as a stock that yields annual catches of more than 200 thousand pounds (90.7 metric tons). There are approximately 905 stocks overall (as reported in the Annual Report to Congress), of which more than 600 are either unknown or undefined. The goal for this measure is to decrease the number of overfished major stocks from a FY 2000 baseline of forty-six to thirty-one by 2008. The original baseline was fifty-six of which ten were later reclassified as not being subject to overfishing requirements as defined in the Fisheries Management Plan.

The term overfishing means that the harvest rate is above a prescribed threshold. Overfished means that the biomass of a given fishery’s stock is below a prescribed threshold. Overfished stocks are defined in the Fisheries Management Plan.

The National Marine Fisheries Service is providing some financial assistance, such as a disaster relief program, to alleviate some of the hardship confronting fishermen during the course of rebuilding fisheries stocks.

**Measure 1b: Number of Major Stocks with an “Unknown” Stock Status**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	New	New	New	120	118	115
Actual		120	120	N/A <sup>1</sup>		
Met/Not Met						

<sup>1</sup> The FY2002 Actual for this measure is anticipated in early FY 2003 pending release of the Report to Congress, Status of Fisheries of the United States, 2002. Future targets will be modified as appropriate.

**Explanation of Measure**

The purpose of this measure is to track the progress of improving knowledge about the status of major stocks as defined in the annual report to Congress. In many cases the current status of stocks under NMFS authority remains unknown.

Not all unknown stocks are of equal importance; parameters such as the value and quantity of catches or known role in the ecosystem as key predators or prey determine a stock’s level of importance. This metric reports on the outcome of investments in staff and data acquisition, such as charter and research vessel days-at-sea and stock assessment methodological research.

It is worth noting that the status of a large number of stocks continues to be classified as either unknown or undefined, which means that an overfishing definition is not possible. Of the 905 stocks mentioned in the 2001 Report to Congress, the status of more than 600 was either unknown or was classified as undefined. The vast majority of these unknown or undefined stocks are classified as minor stocks. Minor stocks, in fact, accounted for 83 percent of the stocks whose status were either unknown or undefined, while only 17 percent of the unknown and undefined stocks were categorized as major. The goal for this measure is to reduce the number of major stocks with an unknown status to no more than ninety-three by FY 2008.

<b>Measure 1c: Percentage of Plans to Rebuild Overfished Major Stocks to Sustainable Levels</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	New	New	New	94%	96%	97%
Actual		93%	93%	N/A <sup>1</sup>		
Met/Not Met						

<sup>1</sup> The FY2002 Actual for this measure is anticipated in early FY 2003 pending release of the Report to Congress, Status of Fisheries of the United States, 2002. Future targets will be modified as appropriate.

## Explanation of Measure

This measure relates directly to the statutory requirements of the Magnuson Stevens Act that require regional councils to develop rebuilding plans for stocks of fish that have been identified as overfished. By maintaining this measure as a percentage, NOAA can measure its performance in putting together an approved rebuilding plan within the eighteen-month expected timeframe. This measure is also best represented as a percentage because to do otherwise would show an inaccurate negative trend where one does not exist. For example, the target for FY 2002 is to have 94 percent of rebuilding plans in place for forty-five overfished major stocks (45x0.94=42). Eventually, the target is to have 100 percent rebuilding plans in place by FY 2007, which by then, the number of overfished stocks will be at thirty-six.

The Magnuson Stevens Act outlines specific parameters and timeframes for rebuilding. At this point in time, major and minor stocks have been differentiated to highlight the relative priorities and complexities of producing a rebuilding plan and the consequent impact on performance measurement. Measurement of this metric will occur in the annual Status of Stocks Report to Congress.

## Program Evaluation

Virtually every aspect of the NMFS’s fisheries science program is peer-reviewed, either internally or outside the agency by, for example, the National Academy of Sciences or the National Science Foundation. NMFS also relies on extensive informal networks of university partnerships and laboratories throughout the U.S. Moreover, reviews often occur by opposing parties’ scientists in the court system when fisheries management decisions are litigated.

## Cross-cutting Activities

### *Intra-Department of Commerce*

The NMFS will focus on reducing overfishing and overcapitalization of U.S. fishery resources by improving stock assessment and prediction, improving essential fisheries habitat, and reducing fishing pressure, including downsizing of fishing fleets. The Department of Commerce, enlisting the support of key bureaus such as the Economic Development Administration, the Minority Business Development Agency, and the National Institute of Standards and Technology, will play a key role in mitigating the impact of these critical resource conservation decisions in the transition to economically-sustainable communities.

### *Other Government Agencies*

The Department of Commerce will also enlist the support of other federal agencies, such as the U.S. Department of Agriculture, the Small Business Administration, and the U.S. Department of Labor, to mitigate the effect of resource conservation decisions.

## External Factors and Mitigation Strategies

Various external factors may affect NMFS' ability to reach its targets. These factors include the impact of climate and other natural conditions, such as El Niño, on biological stocks. In addition, the effect of national and/or local economic conditions may affect NOAA's ability to reach certain targets.

# Performance Goal 2: Sustain Healthy Coasts

## Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth’s environment to promote sustainable growth.

## Rationale for Performance Goal

The National Oceanic and Atmospheric Administration (NOAA) has three primary objectives to sustain healthy coastal ecosystems and the communities and economies that depend on them. These are to (1) protect, conserve, and restore coastal habitats and their biodiversity; (2) promote clean coastal waters; and (3) foster well-planned and revitalized coastal communities. To meet these objectives, NOAA integrates a broad range of research, assessment, and management activities from four of NOAA’s five line offices: the National Ocean Service (NOS), the Office of Oceanic and Atmospheric Research (OAR), the National Marine Fisheries Service (NMFS), and the National Environmental Satellite, Data, and Information Service. NOAA works with many governmental and nongovernmental partners at local, state, national, and international levels to address the critical challenges facing coastal areas. NOAA measures its performance in meeting these objectives by tracking key outcomes, such as the acres of coastal habitat restored, changes in coastal water quality, number of coastal states with effective nonpoint pollution control programs, and the percentage of U.S. shoreline covered by improved ability to identify and mitigate the impacts of natural hazards.

<b>Measure 2a: Number of Acres of Coastal Habitat Benefited (Cumulative)</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	New	New	New	108,531	117,884	120,532
Actual			83,002	108,531		
Met/Not Met				Met		

## Explanation of Measure

Basically, this measure reflects the number of acres that benefit from projects sponsored by NMFS and are funded under the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA). The count includes acres adjacent to those restored that benefit from the restoration as well. For example, one project in 2001 will create seventy acres of marsh and protect up to thirty acres of the main habitat; it also will create about seventy-three acres of wetlands by trapping sediment.

In FY 2002, the DOC Office of the Inspector General (IG) undertook a study on how NOAA reports on its performance measures. Based on the findings of the IG study, the targets and actuals for FY 2001 and FY 2002 have been revised to more accurately document this performance measure. As a result, the actual for FY 2001 is 83,002 acres and the target for FY 2002 should have been 108,531 acres (as opposed to the original target of 122,000), which is also the actual for FY 2002. Therefore, based on the revision, NOAA has met the target for FY 2002.

The original FY 2001 performance results incorrectly included one project scheduled for completion in FY 2002, two scheduled for completion in FY 2003, and two for which the number of benefited acres was overstated by 50 percent. Taken together, these five projects inflated NOAA's FY 2001 count by approximately 33,000 acres (39 percent). The supported number of acres that should have been reported as benefited was approximately 83,002, not the 116,000 contained in the FY 2001 APP/FY 2003 APP.

***FY 2003 and FY 2004 Targets***

This performance measure will be revised in the future. The current performance measure will be changed to reflect a more precise measure of the actual and direct consequences of restoration actions with the recognition that indirect beneficial impacts may occur that cannot be precisely measured at present. With the revised performance measure, a new baseline for tracking progress will be established.

<b>Measure 2b: Reducing the Impacts of Invasive Species within Six Regions in the United States</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	1	1	2	2	2	2
Actual	0	1	2	2		
Met/Not Met	Not Met	Met	Met	Met		

**Explanation of Measure**

Primarily through research and education, this measure takes into account the two components that result in an overall reduction in the number of invasive species introductions in six regions around the country: (1) a decrease in the number of new non-indigenous species that become established in U.S. coastal regions from other countries, when compared to a base period, and (2) a decrease in the spread of new non-indigenous species out of the region where they originally became established. The measure reports on reductions in at least two of the six regions each year on a rolling basis. Therefore, the numbers in the outyears do not rise because results are expected in two different regions each year. Invasive nuisance species have become a major threat to global biodiversity, second only to habitat degradation and loss. The U.S.'s coastal habitats and aquatic resources are both directly and indirectly affected by non-indigenous species silently entering our waters through a variety of pathways, including ballast water discharge, live bait, and aquaculture. Many of these invaders displace native species, disrupting the ecological integrity of their ecosystems and threatening the economic and recreational value of these coastal resources. A recent Cornell University assessment (Environmental and Economic Costs of Nonindigenous Species in the United States, by Pimental, Zuniga, and Morrison.2000. BioScience 50: 53-65.) estimates that the annual cost of all invasive species to the U.S. economy exceeds \$130 billion, which is more than twice the annual cost of damage caused by all natural disasters. OAR will implement a program to monitor national marine sanctuaries for invasive species, develop rapid-response strategies to prevent and control invasive species in national marine sanctuaries and other areas, and continue support of ballast water demonstration projects.

***FY 2003 and FY 2004 Targets***

The target number does not rise because it is not intended to be a cumulative figure. In other words, in each year, steps are taken to reduce the impacts in the given number of regions and the next year steps can be taken in another region. There are literally thousands of nonindigenous species that can either be introduced or spread and dozens of methods by which this could happen.

**Measure 2c: Percentage of U.S. Shoreline and Inland Areas that Have Improved Ability to Reduce Coastal Hazard Impacts**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	5%	14%	6%	15%	17%	17%
Actual	5%	6%	8% <sup>1</sup>	8%		
Met/Not Met	Met	Not Met	Met	Not Met		

<sup>1</sup> This figure was reported as 6 percent in the FY 2003 APP. However, based on the DOC Office of the Inspector General study (FY 2002), NOAA understated the results for FY 2000 and FY 2001 and should have reported 8 percent (instead of 6 percent) of shoreline as having improved ability to handle coastal hazards.

## Explanation of Measure

This measure tracks improvements in NOAA’s ability to estimate the risks of natural hazards in U.S. coastal regions. Activities are underway to develop a coastal risk atlas that will enable communities to evaluate the risk, extent, and severity of natural hazards in coastal areas. The risk atlas will help coastal communities make more effective hazard mitigation decisions to reduce the impacts of hazards to life and property. Currently, many coastal communities make major decisions on land use, infrastructure development, and hazard responses without adequate information about the risks and possible extent of natural hazards in their area. Through the coastal risk atlas, NOS, with other federal and state agencies, will provide a mechanism for coastal communities to evaluate their risks and vulnerabilities to natural hazards for specific U.S. coastal regions and improve their hazard mitigation planning capabilities.

### *FY 2002 and FY 2004 Targets*

In FY 2002, NOAA anticipated the completion of coastal risk atlas pilot projects for Mississippi and Florida. Florida has 8,436 miles of shoreline and Mississippi has 359 miles of shoreline. However, following an end-of-year review of the product delivered by a project partner, NOAA determined that the pilots needed additional work before they could be considered complete. Therefore, NOAA did not meet its FY 2002 target for this measure. NOAA expects the pilots to be completed by the end of the second quarter of FY 2003.

NOAA will also be working to expand the Coastal Risk Atlas to other areas in FY 2003 and FY 2004. None of this expansion will be completed until FY 2004.

## Program Evaluation

NOAA’s goal to sustain healthy coasts is the product of more than twenty-five years of experience helping to understand and manage coastal resources so that their ecological and economic productivity can be fully realized and sustained. Evaluation efforts exist at a variety of levels, from peer reviews of proposals and evaluations of individual projects, to internal and external reviews of entire programs and quarterly reviews of NOAA’s overall performance in coastal stewardship areas. Constituent input is an important part of the evaluation process and is solicited regularly through constituent workshops.

## Cross-cutting Activities

### *Other Government Agencies*

NOAA has leveraged its resources through a variety of effective international, interagency, state, local, private sector, and other partnerships to develop world-class coastal stewardship capabilities. These partnerships are essential to effectively integrate coastal science, assessment, monitoring, education, and management activities.

NOAA provides technical and scientific assistance to a variety of partners involved in protection, monitoring, and restoration of coastal resources. For example, NOAA provides critical information to the U.S. Coast Guard to help the Coast Guard respond to approximately seventy serious oil and chemical spills every year. NOAA also works closely with other agencies, Department of Commerce bureaus, states, local governments, and industry on important cross-cutting activities such as reducing the risks and impacts of natural hazards, protecting and restoring essential fish habitats, reducing runoff pollution, forecasting and preventing harmful algal blooms, and exploring the deep ocean and new uses of the ocean's rich biodiversity.

## External Factors and Mitigation Strategies

Changes in climate, biological, and other natural conditions may affect NOAA's ability to carry out activities to sustain healthy coasts. In addition, many of these coastal stewardship activities depend on contributions from multiple partners, particularly states, territories, and other federal agencies. The failure of one or more of these partners to fulfill their cooperative contributions could have very serious consequences on the overall effort to sustain healthy coasts.

# Performance Goal 3: Recover Protected Species

## Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth’s environment to promote sustainable growth.

## Rationale for Performance Goal

To recover protected species, the National Marine Fisheries Service (NMFS) aims to prevent the extinction of protected species and to maintain the status of healthy species. NOAA measures its performance in meeting these objectives by focusing on the Agency’s ability to manage protected species through conservation programs and recovery plans, and through constant monitoring of and research into the status of species and the stresses that affect their mortality.

The quantitative measures of the probability of extinction for protected species were developed in FY 1999 and FY 2000 to establish the baseline from which program performance (reduction in the probability of extinction) could be measured. New performance measures have been developed to quantify outcome-oriented performance. The National Marine Fisheries Service (NMFS) recognizes the need for objective procedures to determine the status of protected species based on population analyses that take into account species biology and threats to existence that are the result of both human and natural causes. The Recover Protected Species (RPS) FY 2004 proposal is based in part on measuring NMFS’s ability to make progress toward the goal of recovering protected and at-risk species. RPS performance will be measured by the results of attempts such as reducing incidental and direct takes, increasing species habitat, decreasing negative interactions, and mitigating natural phenomena to reduce the risk of extinction for protected species from detrimental human activities.

The NMFS is continually making improvements on its performance measures to better reflect the Agency’s challenging responsibilities and performance in managing the living marine resources of the U.S. New measures will be integrated as they are developed and these new measures will also be tested during the development of a new NOAA strategic plan.

To assist NMFS, a workshop was held in June 2002 to solicit input and map a new path for fisheries management performance. Regarding endangered and threatened species, recommendations were made that performance measures should not only evaluate recovery of the stock but also show whether the stock population is increasing or decreasing and how it relates to recovery plan or take reduction plan goals. Other recommendations indicated that measures should also indicate the value added of fishing gear modification or change, e.g., number of turtles saved. Recommendations on bycatch noted that performance measures should define the bycatch level, evaluate the level of bycatch, and show changes in response to management actions. Finally, recommendations were also made that measures should also evaluate how well the U.S. meets international bycatch agreements. These recommendations are being considered in the development of new measures and metrics.

<b>Measure 3a: Increase in Number of Threatened Species with Lowered Risk of Extinction</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	New	New	2	2	5	5
Actual			2	Available in the FY 2003 report		
Met/Not Met			Met			

## Explanation of Measure

The measure addresses ten of the twenty-seven threatened species that have been identified as the threatened species most in danger of becoming endangered with extinction. The authority to list species as “threatened” or “endangered” is shared by the NMFS, which is responsible for listing most marine species, and the Fish and Wildlife Service of the Department of the Interior, which administers the listing of all other plants and animals. There are two classifications under which a species may be listed:

- Species determined to be in imminent danger of extinction throughout all of a significant portion of their range are listed as “endangered.”
- Species determined likely to become endangered in the foreseeable future are listed as “threatened.”

The threatened species include the Atlantic salmon, Johnson’s seagrass, the loggerhead turtle, the green turtle, the olive ridley turtle, Stellar sea lions, and four species of Pacific salmonids.

Strategies to accomplish this performance measure include enforcing existing conservation measures, conducting priority research as identified in species recovery plans, developing partnerships with states and others to implement conservation programs, and building the tools and technology to improve the effectiveness of conservation actions.

### *FY 2003 and FY 2004 Targets*

The two-year period identified for each performance target reflects the multi-year process required for the cycle of identifying, implementing, and monitoring the strategies identified to accomplish these goals.

<b>Measure 3b: Number of Commercial Fisheries that Have Insignificant Marine Mammal Mortality</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	New	New	2	6	6	8
Actual			2	Available in the FY 2003 report		
Met/Not Met			Met			

## Explanation of Measure

This measure tracks the number of commercial fisheries where marine mammal deaths are substantial and where these deaths will be reduced to insignificant levels by 2007. By definition, insignificant levels mean that total mortality or rate of death is no more than 10 percent of the maximum number of marine mammals that could die from human-caused mortality. For this measure, fifteen out of thirty-two fisheries have been targeted.

One of the most significant impacts on marine mammal stocks is death from entanglement and drowning in fishing gear. Certain marine mammal species are particularly vulnerable to interactions with fisheries because of location and type of fishing gear used. The fifteen fisheries and marine mammal stocks targeted in this measure are the following: for the Western North Atlantic stock of coastal bottlenose dolphins, the fisheries are the Mid Atlantic coastal gillnet, North Carolina inshore gillnet, Southeast Atlantic gillnet, Southeast Atlantic shark gillnet, Atlantic blue crab trap or pot, Mid Atlantic haul or beach seine, North Carolina long haul seine, North Carolina roe mullet stop net, and Virginia pound net. For the Gulf of Main/Bay of Fundy stock of harbor porpoise, the fishery is the Northeast sink gillnet. For the Atlantic large whale, the fisheries are the

Northeast and Mid Atlantic American lobster trap or pot, Northeast sink gillnet, Mid Atlantic coastal gillnet, and Southeast Atlantic shark gillnet. Finally, for the Pacific stock of thresher shark and swordfish the fishery is the California and Oregon fishery. New fishing technologies to reduce gear impacts and strategies to reduce offshore cetaceans need to be developed. Interactions between fishing gear and marine mammals need to be devised; NOAA also needs to educate fishermen about how they can avoid marine mammals while still being able to catch fish.

A successful program to reduce mortality of marine mammal stocks will require research on marine mammal behavior, assessment of marine mammal populations, reduction of interactions in problem fisheries, and monitoring and analysis via the observer program.

***FY 2003 and FY 2004 Targets***

The two-year period identified for each performance target reflects the multi-year process required for the cycle of identifying, implementing, and monitoring the strategies identified to accomplish these goals.

<b>Measure 3c: Increase in Number of Endangered Species with Lowered Risk of Extinction</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	New	New	3	6	6	6
Actual			3	Available in the FY 2003 report		
Met/Not Met			Met			

**Explanation of Measure**

The term “endangered species” is defined in the Endangered Species Act as any species that is in danger of extinction. Of the list of twenty-nine endangered species, eleven have been identified as the most critically in danger of extinction. These eleven species include the Pacific leatherback turtle, kemp’s ridley turtle, hawksbill turtle, Hawaiian monk seal, Western Stellar sea lion, shortnose sturgeon, and five species of Pacific salmonids. Efforts to prevent extinction will focus on identifying the factors that contribute to extinction and developing and implementing recovery plans to address these factors. Reducing the probability of extinction requires a reduction in human activities that are detrimental to the survival of protected species, that is, reducing incidental and direct catch (takes), increasing species habitat, decreasing negative interactions, and mitigating natural phenomena.

***FY 2003 and FY 2004 Targets***

The two-year period identified for each performance target reflects the multi-year process required for the cycle of identifying, implementing, and monitoring the strategies identified to accomplish these goals. While it may not be possible to recover or de-list a species in a one or two-year time frame, progress can be made to reduce the likelihood of these species becoming extinct; for some it is trying to stop a steep decline (right whales, stellar sea lions), for others it is trying to increase their numbers/abundance (ridley turtles).

## Program Evaluation

Evaluation efforts include peer reviews of proposals, internal and external reviews of programs, and quarterly reviews of NMFS's overall performance in protected species recovery. Constituent input is an important part of the evaluation process and is solicited regularly through constituent workshops.

## Cross-cutting Activities

### *Other Government Agencies*

Over the past year, NMFS has developed innovative partnerships with the states of Maine, Washington, Oregon, and California to promote the recovery of listed and at-risk salmon and steelhead species.

## External Factors and Mitigation Strategies

The impact of climate, biological, and other natural conditions affect NMFS' efforts to recover protected species and maintain the status of healthy species. Research may identify opportunities to pursue mitigating strategies in some cases.

# Performance Goal 4: Advance Short-term Warnings and Forecasts

## Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth’s environment to promote sustainable growth.

## Rationale for Performance Goal

The environment has profound effects on human welfare and economic well-being. Each year hundreds of lives and billions of dollars are lost due to severe storms, floods, and other natural hazards. The National Oceanic and Atmospheric Administration’s (NOAA’s) current ability to predict short-term change is restricted by observations that are incomplete. This limits the ability to improve basic understanding and predictive modeling of weather and other natural phenomena. Although NOAA can do nothing to prevent natural disturbances, it can minimize impact on humans. NOAA will continue to improve its observing systems, develop a better understanding of natural processes, and enhance numerical weather prediction models and dissemination systems.

<b>Measure 4a: Lead Time (Minutes), Accuracy (%), and False Alarm Rate (FAR, %) of Severe Weather Warnings for Tornadoes</b>		<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Lead Time (minutes)	Target	11	12	13	11	12	12
	Actual	12	10	10	12		
	Met/Not Met	Met	Not Met	Not Met	Met		
Accuracy (%)	Target	70%	70%	68%	69%	72%	72%
	Actual	70%	63%	67%	76%		
	Met/Not Met	Met	Not Met	Not Met	Met		
FAR (%)	Target	72%	65%	73%	71%	72%	70%
	Actual	73%	76%	72%	73%		
	Met/Not Met	Not Met	Not Met	Met	Not Met		

## Explanation of Measure

The lead time for a tornado warning is the difference between the time the warning was issued and the time the tornado affected the area for which the warning was issued. The lead times for all tornado occurrences throughout the year are averaged to get this statistic. The accuracy of the warnings is the percentage of times a tornado actually occurred in an area that was covered by a warning. The false alarm rate is the percentage of times a tornado warning was issued but no tornado occurrence was verified. The false alarm rate was added as a reportable measure in FY 2000, although it had been collected and used internally previously. NOAA will continue data collection and verification, and false alarm rates will be reported in future years.

NWS met only one out of the three tornado performance goals for FY 2001. However, the FY 2001 accuracy goal was missed by only one percentage point, which is statistically insignificant and well within standard deviation for this measure. NWS missed the warning lead time goal and is currently reviewing the storm data from individual events to pinpoint the causes and take corrective actions. Final data from this analysis should be available in late February 2003. Tornado lead times

have essentially remained steady at ten to eleven minutes since the deployment of the Next Generation Weather Radar (NEXRAD) network in the mid 1990s. NWS targets for FY 2003 and FY 2004 will remain at twelve minutes and will gradually increase to minutes minutes by FY 2005 after completion of retrofits of the NEXRAD systems, implementation of new training techniques such as a weather event simulators, and realization of the operational benefits of Advanced Weather Interactive Processing System’s five software enhancements.

**Measure 4b: Lead Time (Minutes) and Accuracy (%) for Severe Weather Warnings for Flash Floods**

		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Lead Time (minutes)	Target	54	55	45	45	50	52
	Actual	44	43	46	52		
	Met/Not Met	Not Met	Not Met	Met	Met		
Accuracy (%)	Target	85%	86%	86%	86%	87%	89%
	Actual	85%	86%	86%	89%		
	Met/Not Met	Met	Met	Met	Met		

**Explanation of Measure**

The lead time for a flash flood warning is the difference between the time the warning was issued and the time the flash flood affected the area for which the warning was issued. The lead times for all flash flood occurrences throughout the year are averaged to get this statistic. The accuracy of the warnings is measured by the percentage of times a flash flood actually occurred in an area that was covered by a warning. NOAA’s actions include data collection and verification, and new performance measures will be reported in future years. During FY 2001, both goals for flash flood warnings were met. The FY 2001 lead time actual was higher than the target due to a 15 percent increase in the number of flash flood events (2,600 compared with the ten-year average of 2,215). Performance scores tend to be higher if the number of events is above average in a given year. NWS expects steady improvement in both flash flood lead time and accuracy leading into FY 2003. The steady improvement is linked to the planned implementation of new flash flood decision assistance tools in FY 2002 and NEXRAD retrofits in FY 2003. The NEXRAD retrofits will allow NWS forecasters to run new algorithms for improved rainfall estimates.

**Measure 4c: Hurricane Forecast Track Error (48 Hours)**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	New	New	New	142	130	129
Actual				124		
Met/Not Met				Met		

## Explanation of Measure

This measure was originally, “Accuracy of Hurricane Track Forecasts (48 hours).” The measure has been revised to better describe the activity and provide more accurate means of measuring the performance for this strategic goal.

Track forecasts have a significant impact on the U.S. economy. The average cost to evacuate the Atlantic coastline of the U.S. is approximately \$1 million dollars per mile. By improving track forecasts NOAA can both save lives and avoid unnecessary economic losses. This goal measures the difference between the projected location and the actual location in nautical miles for a forty-eight-hour forecast. This measure has been reintroduced for the FY 2003 Annual Performance Plan, replacing hurricane landfall warning lead time. Although landfall warnings are critical, only one to two storms make landfall in the U.S. each year. No storms made landfall during 2000 and 2001. Based on feedback from its key users, including emergency managers, NWS has concluded the track forecast measure provides a better gauge for the performance of our hurricane forecasting operations. Although NWS maintains statistics on twenty-four, forty-eight, and seventy-two-hour hurricane track forecasts, the forty-eight-hour measure is the most important time frame for emergency managers and other government officials to make planning decisions related to hurricanes, including coastal evacuations. The FY 2002 and 2003 targets are consistent with the trend for the last thirty years. The track accuracy will improve to 128 by 2007 with steady improvements in hurricane models and forecasting techniques, including use of ensemble forecasts, and completion of ongoing research within the U.S. Weather Research Program (USWRP).

### Measure 4d: Accuracy (%) of One-day Threat Score Forecast of Precipitation

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	New	New	New	New	25%	25%
Actual				30%		
Met/Not Met				Met		

## Explanation of Measure

This measure was originally, “Accuracy of 3-day Forecast of Precipitation.” The measure has been revised to better reflect the activity and provide more accurate means of measuring the performance for this strategic goal. The measure reflects the ability to accurately forecast a precipitation event one day in advance. NOAA’s actions include data collection and verification.

The Hydrometeorological Prediction Center (HPC) of the NOAA National Weather Service began providing quantitative precipitation forecasts (QPFs) in 1961. These forecasts indicate how much precipitation is expected, not just whether it will rain or snow. HPC has focused on relatively heavy amounts of precipitation, usually a half inch or more in a twenty-four-hour period, because of the major safety and economic impacts such heavy precipitation can have in producing flooding, alleviating drought, and affecting river navigation. The HPC began making QPFs through two days into the future in 1965 and through three days in 2000.

The HPC has tracked the accuracy of these forecasts very carefully over the years using a metric that is very challenging. This accuracy metric ranges from zero percent, indicating no skill, to 100percent for a perfect forecast. In verifying the accuracy of a one-inch precipitation forecast for day one, for example, the HPC first determines everywhere in the U.S. where an inch or more actually fell and was observed by rain gauges. On a given day this occurs only over a very small percentage of the country, although wherever it falls is a significant event for that particular area. The HPC then compares these observed one-inch areas with the one-inch areas it had forecasted counting only those points in the U.S. where HPC forecasted and

observed at least an inch as being an accurate forecast (these points are called “hits”). Thus, if HPC forecasts one inch to fall at the point representing Washington, DC, and it observed only three-quarters of an inch actually had fallen in that specific area, the forecast is then rated as a “miss,” even if an inch of rain was observed to have fallen at the points nearby representing the area of Fairfax City, Virginia, or the area of Upper Marlboro, Maryland. The overall accuracy score for the country for that particular day one forecast is then determined by dividing the total number of correctly forecast points (hits) by the total number of points where HPC had either forecast it would rain an inch or it had actually rained an inch. In summary, to earn a high accuracy score, HPC has to forecast the time, place, and amount of precipitation very well.

Several important point should be noted. First, although the accuracy scores are low with respect to perfection, the accuracy is sufficiently high to be of major utility to the U.S.’s decisionmakers. As indicated by the numerous requests for these products, especially in times of hardship, the Federal Emergency Management Agency, U.S. Army Corps of Engineers, the media, and farmers all rely heavily on NOAA forecasts to decide how to proceed.

Second, the scores are continuing to improve in accuracy. The metrics from the last forty years indicate the day two forecasts of one inch of precipitation in 2001 had the skill of day one forecasts in 1984, and our day three forecasts in 2001 were as accurate as our day two forecasts in 1989.

***FY 2003 & FY 2004 Targets***

In FY 2003 the NWS will be implementing the next generation super computer. The new computer will run higher resolution regional models (from 22 Km ETA models to 10 Km ETA models), thus improving the forecast skills for this model.

<b>Measure 4e: Lead Time (Hours) and Accuracy (%) of Winter Storm Warnings</b>							
		<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Lead Time (hours)	Target	New	12	13	13	13	14
	Actual	11	9	13	13		
	Met/Not Met		Not Met	Met	Met		
Accuracy (%)	Target	New	85%	86%	86%	88%	89%
	Actual	85%	85%	90%	89%		
	Met/Not Met		Met	Met	Met		

**Explanation of Measure**

The FY 2001 targets for lead time in hours and accuracy of winter storm warnings for this performance measure were met. The FY 2002 target for accuracy is lower than the FY 2001 actual because of a 30 percent increase in the number of winter storms in FY 2001. An increase in the number of storms tends to improve performance scores in a given year. This higher level of winter storm activity is not expected during FY 2002 and FY 2003. A winter storm warning is issued when four or more inches of snow or sleet are expected in the next twelve hours, or six or more inches in twenty-four hours, or one-quarter of an inch or more of ice accretion. This performance indicator measures the accuracy and advance warning lead time of these conditions. Improving the accuracy and advance warnings of winter storms enables the public to take the necessary steps to prepare for disruptive weather conditions. With the introduction of high-resolution regional forecast models and introduction of new operational forecast techniques in FY 2002 and FY 2003, NWS lead times will improve to fifteen minutes and 90 percent accuracy by FY 2005.

**Measure 4f: Accuracy (%) and FAR (%) of Forecasts of Ceiling and Visibility (1/2 Miles/500 Feet) (Aviation Forecasts)**

		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Accuracy (%)	Target	New	New	New	New	45%	46%
	Actual				45%		
	Met/Not Met				Met		
FAR (%)	Target	New	New	New	New	71%	70%
	Actual				71%		
	Met/Not Met				Met		

**Explanation of Measure**

This measure originally covered “1/4 mile/200 feet.” Conditions of a 200-foot ceiling and one quarter mile visibility are components of the FY 2002 and earlier performance measure accuracy and false alarm rate percentages. However, these conditions are rare events. Because of the infrequency of these conditions, the performance measure presented low skill score percentages. The NWS decided that a better criterion of performance is an aviation performance measure based on a 500-foot ceiling and one-half mile of visibility for both accuracy and false alarm rate. In addition, the new criterion reflects instrument flight rating (IFR) rules.

In accordance with the NWS strategic plan, this type of measure was added in FY 2000 to reflect a segment of customers that had not been represented in other performance measures. Visibility and cloud ceiling forecasts are critical for the safety of aircraft operations

The FY 2003 President’s budget includes a budget initiative to improve aviation weather forecasts. The NWS expects that with funding from this initiative, an improved and expanded training program, and collaborative research with other federal government agencies to develop new software tools and forecast techniques, accuracy will gradually improve in the future.

**Measure 4g: Accuracy (%) of Forecast for Wind Speed and Wave Height (Marine Forecasts)**

		FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Wind Speed	Target	New	New	New	New	54%	54%
	Actual				52%		
	Met/Not Met				Met		
Wave Height	Target	New	New	New	New	66%	66%
	Actual				68%		
	Met/Not Met				Met		

## Explanation of Measure

This measure was originally a “combined accuracy forecast for marine wind and wave.” The measure has been revised to better reflect the activity and provide more accurate means of measuring the performance for this strategic goal. Basically, this performance indicator measures the accuracy of wind and wave forecasts, which are important for marine commerce. The new measure separates the two components to better present the forecast in terms of wind speed and wave height.

In accordance with the NWS strategic plan, this type of measure was added in FY 2000 to reflect another segment of customers that had not been represented in other performance measures. NOAA actions to be taken include data collection and verification, which will be added to forecasts for the Great Lakes. The NWS expects the accuracy to gradually improve by 2008. This improvement will be possible as a result of operational deployment of new marine forecast capabilities, including AWIPS Build 5 software, implementation of new wave forecast models in FY 2002, and improved communication and dissemination techniques to marine users.

## Program Evaluation

NOAA's vision for FY 2005 is to provide significantly improved short-term warning and forecast products and services that enhance public safety and the economic productivity of the U.S. While it is difficult to see the improvements on an annual basis because of the scientific nature and seasonal variations of weather events, historical trends have shown that NOAA continues to improve the accuracy and advance warning lead time of severe weather hazards.

Program evaluations at NWS field offices are conducted annually. Quality control procedures are followed to ensure the highest reliability of gathered data and weather products. The National Academy of Sciences is also involved in program analysis and evaluation processes on a national level.

## Cross-cutting Activities

### *Intra-Department of Commerce*

NOAA works closely with the National Institute of Standards and Technology and the Economic Development Administration on the Federal Natural Disaster Reduction initiative, which focuses on reducing the costs of natural disasters, saving lives through improved warnings and forecasts, and providing information to improve resiliency to disaster.

### *Other Government Agencies*

NOAA also works closely with other agencies such as the Federal Emergency Management Agency, the Corps of Engineers, the Bureau of Reclamation, the Department of Defense, as well as state and local governments, to complement their meteorological services in the interest of national security. NOAA works closely with the U.S. Coast Guard to disseminate marine weather warnings and forecasts and works directly with the Federal Aviation Administration on aviation forecasts and with the National Aeronautics and Space Administration on launch forecasts and solar forecast effects.

### *Government/Private Sector*

Weather and climate services are provided to the public and industry through a unique partnership between NOAA and the private meteorological sector. NOAA provides forecasts and warnings for public safety, and the private sector promotes dissemination of forecasts and tailors basic information for business uses.

## External Factors and Mitigation Strategies

A number of factors unique to the atmospheric sciences must be considered when reviewing the performance measures for this goal. The primary factor to consider is the natural variation of this goal related to annual fluctuations in meteorological conditions. Another factor concerns the damage to critical equipment (for example, supercomputer fire and satellite outages) that can affect daily operations for extended periods, even though numerous safety measures and backup procedures are in place.

Although the performance measures for this goal may improve, the impact on society may not be obvious because of factors beyond NOAA's control. For example, hurricane warnings may become more accurate, but because of the increase in population along the coastlines, the deaths, injuries, and/or damage estimates may increase.

Improving NOAA's understanding of the natural environment requires advanced infrastructure and therefore continual investment in new technology such as supercomputers and environmental satellites.

NOAA relies on its partners in the media, private sector, and the state and local emergency management community to disseminate weather warnings.

# Performance Goal 5: Implement Seasonal to Interannual Climate Forecasts

## Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth’s environment to promote sustainable growth.

## Rationale for Performance Goal

The National Oceanic and Atmospheric Administration (NOAA) works with academic and international partners to provide one-year lead time forecasts of global climate variability, especially that resulting from El Niño/Southern Oscillation (ENSO), and consequent precipitation and surface temperature distributions. These forecasts increase society’s ability to mitigate economic losses and social disruption resulting from such events.

### Measure 5a: Determine the Accuracy of the Correlation between Forecasts of the Southern Oscillation Index (SOI) and El Niño/La Niña Events

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	0.85	0.85	0.85	0.85	0.85	0.86
Actual	0.85	0.84	0.85	0.85		
Met/Not Met	Met	Not Met	Met	Met		

## Explanation of Measure

The atmosphere is tightly linked to ocean temperatures and circulation patterns. The pattern of warming of the tropical Pacific over periods of three to seven years known as ENSO has a tremendous impact on U.S. and global climate. This measure specifically assesses the correlation between forecasts of Pacific sea surface temperatures (based on models) and actual sea surface temperature (based on satellite and on site observations).

NOAA’s ENSO forecasts have become much more reliable in recent years. The 1997–98 El Niño (the warm phase of the ENSO cycle) was the best monitored and most successfully predicted El Niño on record. Typical impacts on the United States and the Atlantic basin include the following:

- Hurricanes: Below normal number of tropical storms/hurricanes in the Atlantic, although this does not imply any limits on the strength or location of any given tropical system.
- Monsoons: A drier-than-normal North American Monsoon, especially for Mexico, Arizona and New Mexico.
- Drought: A drier-than-normal fall and winter in the U.S. Pacific Northwest.
- Wintertime Storms: A wetter-than-normal winter in the Gulf Coast states from Louisiana to Florida, and in central and southern California if El Niño is strong.
- Warmer Temperatures: A warmer than normal late fall and winter in the northern Great Plains and upper Midwest.

NOAA provided advanced forecast of El Niño effects, leading to great savings for a variety of economic sectors. Weather and climate-sensitive industries that are directly impacted by weather (such as agriculture, construction, energy distribution, and outdoor recreation) account for nearly 10 percent of GDP. Furthermore, weather and climate indirectly impacts an even larger portion of the U.S.'s economy, extending to parts of finance and insurance, services, retail and wholesale trade, as well as manufacturing. El Niño impacts important business variables like sales, revenues, and employment in a wide range of climate-sensitive industries and sectors. Overall, total U.S. economic impacts of the 1997-1998 El Niño were estimated to be on the order of \$25 billion.

ENSO forecasts require a variety of data, such as ocean observations, remote satellite-based observations, and terrestrial measurements. This program is the only federal effort aimed at providing forecasts of climate events and their consequent impact. NOAA will undertake efforts to determine the limits of predictability of atmospheric changes induced by tropical Pacific sea surface temperature changes; to diagnose and model the global response to warm, cold, and neutral states of the ENSO cycle; and to examine the changes in probabilities of extreme events induced by ENSO.

<b>Measure 5b: U.S. Temperature Forecasts (Skill Score)</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	20	20	20	20	20	21
Actual	23	27	20	18		
Met/Not Met	Met	Met	Met	Not Met		

### Explanation of Measure

The Heidke Skill Score (HSS) is one of several accepted standards of forecasting in the scientific community. It is calculated as follows:

Heidke skill score:  $S = ((c-e)/(t-e)) \times 100$

where c = number of stations correct

and e = number of stations correct by chance =  $(1/3) \times$  total number of stations in a 3 equal class system

and t = number of stations, total

S is approximately equal to one-half of the correlation between forecast and observations.

Accurate measures of temperature are critical to many sectors of the national economy, including agriculture and energy utilities. This measure compares actual observed temperatures with forecasted temperatures from areas around the country. For those areas of the United States where a temperature forecast (warmer than normal, cooler than normal, normal) is made, this score measures how much better the prediction is than the random chance of being correct.

Therefore, the HSS is a function of both whether or not a forecast verifies and whether or not it was predicted, but does not reward when the forecast verifies by chance. Skill score is based on a scale of -50 to +100. If forecasters match a random prediction, the skill score is zero. Anything above zero shows positive skill in forecasting. Given the difficulty of making advance temperature and precipitation forecasts for specific locations, a skill score of 20 is considered quite good and means the forecast was correct in almost 50 percent of the locations forecasted. Forecasts will likely be better in El Niño years than in non-El Niño years. Temperatures across the U.S. will be measured using NOAA's cooperative network maintained by volunteers across the nation. Temperature data will be collected and analyzed by NOAA.

**FY 2003 & FY 2004 Targets**

Based on preliminary data, NOAA did not meet the FY 2002 target. Skill of seasonal prediction is influenced by the strength of predictors, El Niño being one. The El Niño pattern experienced in FY 2002 was weak-to-moderate, resulting in reduced overall accuracy of climate forecasts for the year. However, the preliminary actual is within the standard deviation of +/- 1 point for this measure. NWS is planning a major increase in climate computing capacity and associated model resolution in FY 2003. These computing enhancements may provide some improvement in skill scores.

**Measure 5c: Number of New Monitoring or Forecast Products that Become Operational per Year (Cumulative)**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	New	New	4	8	12	16
Actual			4	8		
Met/Not Met			Met	Met		

**Explanation of Measure**

This performance measure reflects the seasonal-to-interannual climate team’s commitment to public service by stressing products that are available for public usage rather than data sets. A major motivation for this change was the formation of the new NOAA Climate Observations and Services program. New products will be developed and tested through NOAA research and implemented operationally through the NWS’s Climate Prediction Center (NCDC) as appropriate. As NOAA implements these products, usage will be evaluated through data transfers and external constituent interactions. Four new operational monitoring and forecast products became available to the public in FY 2002, namely:

- ❶ A gridded, daily U.S. surface temperature analysis for monitoring monthly and seasonal outlooks.
- ❷ Global monthly precipitation analyses extended back to 1948.
- ❸ A prototype near real-time global precipitation analyses every half hour at 8 Km spatial resolution.
- ❹ Heat index forecasts expressed in probabilistic terms.

Research advances provide the potential for NOAA to significantly expand its range of climate products and services, particularly in areas of high customer demand for information and where climate variability significantly affects national interests. Examples include improved information on and forecasts of extreme climate events, such as droughts and floods, and development of new forecasts on time scales that are not currently included in NOAA’s operational product line but where customer demand and interest is large and growing.

**Measure 5d: New Climate Observations Introduced**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	New	New	120	174	275	412
Actual			132	192		
Met/Not Met			Met	Met		

The numbers for FY 2004 are based on the FY 2003 President’s budget which has an increase for the Argo profiling float system. If there is no increase then the numbers for 2004 go back to FY 2002’s target of 275 annually.

## Explanation of Measure

NOAA is undertaking new efforts to better describe the atmosphere—ocean—land system to improve its climate monitoring and prediction capability. As a part of this effort, the Office of Oceanic and Atmospheric Research and the National Environmental Satellite, Data, and Information Service (NESDIS) will expand their existing observation systems, that is, data buoys and new satellites.

The oceans provide the largest source of potential predictability for the climate system as well as the potential to produce large climatic surprises, and yet they are currently critically under-observed for certain variables and in many regions. This measure will continue NOAA's long-term and sustained effort to improve ocean observational capabilities and to increase the usefulness of observations for this critical part of the Earth's climate system. NOAA will complete an annual report detailing how these new climate observations increased data density and coverage and how they will be used in climate analysis and prediction.

NOAA's actions include, as resources permit, expanding its ocean observing systems, focusing on the highest priority variables for climate monitoring and prediction, and addressing critical oceanic data voids. NOAA will also place high priority on improving the assimilation and optimal use of ocean observations in climate models that are used for climate analyses and forecasts. NOAA will also estimate the reduction in analysis error that accompanies increases in data quality, density, and coverage.

## Program Evaluation

A number of NOAA line offices participate in the seasonal-to-interannual performance goal. The Office of Oceanic and Atmospheric Research (OAR) conducts periodic reviews of the activities of its Environmental Research Laboratories. NESDIS holds management performance reviews several times a year. NWS conducts reviews of the National Centers for Environmental Prediction (NCEP). Programs are also evaluated by the National Science Foundation and the National Research Council. NOAA holds annual constituent workshops at which NOAA's seasonal climate forecast efforts are discussed with the community of seasonal-to-interannual climate forecast users, and input is solicited to shape future efforts.

## Cross-cutting Activities

### *Other Government Agencies*

NOAA works with a wide variety of partners in the area of climate forecasts, including other federal agencies (for example, the Federal Emergency Management Agency and the U.S. Agency for International Development), state and local agencies (for instance, state departments of environmental protection and emergency preparedness managers), academia, foreign government agencies, and international organizations. In preparing for the 1997–98 El Niño, NOAA worked closely with the Federal Emergency Management Agency and state and local officials, greatly improving public preparedness for the severe weather resulting from El Niño.

## External Factors and Mitigation Strategies

A major failure of Earth observing and computing infrastructure would impair NOAA's ability to produce seasonal to interannual forecasts. NOAA has been looking for backup outside the organization. For example, the Department of the Navy provides backup to the National Centers for Environmental Prediction mainframe computer.

An unanticipated major increase of the customer base for climate-related products may strain NOAA resources. In such an event, NOAA would prioritize its activities to meet the immediate increase in demand while it looks for alternative ways to meet the needs of all its customers.

Improving our understanding of the natural environment requires advanced infrastructure, and therefore, continual investment in new technology, such as supercomputers and environmental satellites.

# Performance Goal 6: Predict and Assess Decadal to Centennial Change

## Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth’s environment to promote sustainable growth.

## Rationale for Performance Goal

National Oceanic and Atmospheric Administration (NOAA) scientists provide policymakers with the scientific information and expert assessments necessary to make decisions on long-term global and regional environmental issues. NOAA research, conducted in conjunction with its national and international partners, contributes significantly to the understanding of these issues. Experts in these fields periodically compile, summarize, and evaluate the current state of scientific knowledge and report their findings in assessment documents. NOAA’s research, authors, and review of these documents are essential to ensure the highest quality science is available to support important decisions on long-term climate issues. Additionally the national effort in climate research increasingly focuses on reducing uncertainty in projections of climate change and on building the research, modeling, and observational systems to further this objective. Central to the issue of climate change are descriptions of the greenhouse gases that influence how radiation is absorbed by the planet. Knowledge of how carbon dioxide is stored and released and how this will change in the future is essential. Other greenhouse gases and aerosols with shorter atmospheric lifetimes may offer the chance to influence climate change over a shorter period, as well as provide benefits for other environmental issues.

<b>Measure 6a: Assess and Model Carbon Sources and Sinks Throughout the United States</b>				
	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>
Target	Establish five new pilot atmospheric profiling sites and four new oceanic carbon tracks.	Reduce uncertainty of atmospheric estimates of U.S. carbon balance to +/-50%.	Improved model-data fusion techniques and reduce uncertainty of atmospheric transport models.	Reduce uncertainty of atmospheric estimates of U.S. carbon balance to +/-40%.
Actual	Identified five pilot carbon profiling sites and four new oceanic carbon tracks.			
Met/Not Met	Not Met			

## Explanation of Measure

Carbon dioxide is the most important of the greenhouse gases that are undergoing change due to human activity. On average, about one half of all the carbon dioxide emitted by human activity is taken up by the oceans and the terrestrial biosphere (trees, plants and soils). These reservoirs of carbon are known as carbon “sinks.” However, the variation in the uptake from year to year is very large and not understood. A large portion of the variability is believed to be related to the terrestrial biosphere in the Northern Hemisphere, and quite likely North America itself. NOAA needs to understand the source of this variability if it is to provide scientific guidance to policymakers who are concerned with managing emissions and sequestration of carbon dioxide. This can only be done by making regional-scale measurements of the vertical profile of carbon dioxide

across the U.S. which, combined with improved transport models, can be used to determine carbon dioxide sources and sinks on a regional (about 600 mile) scale. This will provide a powerful tool to gauge the effectiveness of carbon management and enhanced sequestration efforts.

NOAA will work to reduce the uncertainties in climate projections. Progress depends on major advances in understanding and modeling radiative forcings (atmospheric concentrations and radiative roles of greenhouse gases and aerosols) and climate feedback mechanisms.

Through these activities, NOAA will develop a long-term climate observing system that provides an observational foundation to evaluate climate variability and change and provides the mechanism to support policy and management decisions related to climate variability and change at national and regional scales.

<b>Measure 6b: Assess and Model Carbon Sources and Sinks Globally</b>				
	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>	<b>FY 2005</b>
Target	Establish three new global background sites as part of the global flask network <sup>1</sup> .	Complete a working prototype of a coupled carbon-climate model.	Develop carbon climate scenarios for Input to assessment.	Improve measurements of North Atlantic and North Pacific Ocean basin carbon dioxide fluxes to within +/-0.1 petagrams carbon/year.
Actual	Established three new global background sites as part of the global flask network <sup>1</sup> .			
Met/Not Met	Met			

<sup>1</sup> The Global Flask Network is an observational network of monitoring stations with headquarters in Boulder, Colorado.

## Explanation of Measure

By FY 2008, NOAA will provide publicly available, routine inventory of carbon, heat, and salinity in the ocean basins and provide near-real-time, global carbon source and sink maps.

The research community is moving toward monthly mean maps, but it is hampered by data that are not at the appropriate temporal resolution. In addition, carbon models are only partially coupled to computer models that account for a changing ocean, atmosphere, and land.

Preliminary work suggests that feedbacks between the land and ocean and the atmospheric carbon dioxide concentration can be strong and result in release of carbon to the atmosphere from the stored pools on land and in the ocean.

Activities planned to assess and model carbon sources and sinks in both the North American and global programs are similar but vary in scale, with the North American network having a finer spatial scale. These activities consist of increasing the observing network by establishing new sampling sites, and completing or improving computer models to simulate atmospheric transport of carbon. Both cases will result in more accurate estimates of the atmospheric carbon balance.

The carbon atmospheric observing system over North America has been designed to develop regional (about 600 mile) scale estimates of carbon dioxide sources and sinks, especially within the U.S. It requires vertical profiling over terrestrial ecosystems using aircraft and tall towers.

The global atmospheric observing system is designed to determine carbon dioxide sources and sinks for global continental-scale regions and involves additional surface measurements at background (clean air) sites such as coastal regions. The current lack of data results in large variations in carbon source-sink estimates at this scale.

**Measure 6c: Determine the Actual Long-term Changes in Temperature and Precipitation Over the United States**

Target	Capture more than 60% of true contiguous U.S. temperature trend and capture more than 25% of true contiguous U.S. precipitation trend.	Capture more than 70% of true contiguous US temperature trend and capture more than 40% of true contiguous U.S. precipitation trend.	Capture more than 80% of true contiguous U.S. temperature trend and capture more than 55% of true contiguous U.S. precipitation trend.	Capture more than 90% of true contiguous U.S. temperature trend and capture more than 70% of true contiguous U.S. precipitation trend.
Actual	Captured more than 85% of true contiguous U.S. temperature trend and captured more than 55% of true contiguous U.S. precipitation trend.			
Met/Not Met	Met			

**Explanation of Measure**

This measure is designed to address the significant shortcomings in past and present observing systems. By FY 2006, it will capture more than 95 percent of the true national temperature trend in the contiguous United States. Further, by FY 2006, it will also capture more than 80 percent of the true national precipitation trend in the contiguous United States.

Inadequacies in the present observing system increase the level of uncertainty when government and business decisionmakers consider long-range strategic policies and plans. The U.S. Climate Reference Network, a benchmark climate-observing network, will provide the U.S. with long-term (fifty to 100 years) high quality climate observations and records with minimal time-dependent biases affecting the interpretation of decadal to centennial climate variability and change. The fully deployed network will ensure that NOAA can measure more than 90 percent of the variance in monthly trends of temperature and precipitation at the national level. NOAA will deploy instrument suites in a combination of single and nearby paired sites.

Deployment of the U.S. Climate Reference Network is continuing, with stations being added over the next several years. However, due to funding limitations, the full implementation has been scaled back to ensure funds are allocated to maintain the operational performance of the network and ensure the quality of the data is the highest possible, given the current state of technologies. While national trends will still be captured, as noted in the performance measure, the smaller-sized network will not be able to achieve the level of monitoring and evaluation of climate variations and trends at the regional scale.

**Measure 6d: Results of 90% of NOAA Climate Research Activities Cited in the 2001 Intergovernmental Panel on Climate Change's Third Assessment of Climate Change**

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	N/A <sup>1</sup>	N/A <sup>1</sup>	90% cited	N/A <sup>1</sup>	N/A <sup>1</sup>	N/A
Actual	N/A <sup>1</sup>	N/A <sup>1</sup>	100% cited	N/A <sup>1</sup>		
Met/Not Met	N/A <sup>1</sup>	N/A <sup>1</sup>	Met			

<sup>1</sup> The Intergovernmental Panel on Climate Change assessments are only published every five years. In off years there are no results to report.

## Explanation of Measure

Intergovernmental Panel on Climate Change (IPCC) assessments provide the scientific, technical, and economic information used to evaluate the effects of human activities and natural variability on climate system and to evaluate strategies to reduce and respond to these effects. These assessments are conducted under the sponsorship of the World Meteorological Organization and the United Nations Environment Program and take several years to produce. They are undertaken every three to five years based on advancements in science. The current assessment was released in January 2001. NOAA climate research results are available in articles that describe research methods, results, and conclusions. These articles are published in peer-reviewed, scientific journals and become part of the permanent scientific record. These articles are used as the basis for the IPCC assessments. The IPCC provides periodic assessments of the understanding of all aspects of global climate change, including climate system, the impacts of climate changes, and options for mitigation. More than 90 percent of the research on climate performed by NOAA scientists was used (cited) as source material for the current assessment document. This measure was added in the FY 2001 Annual Performance Plan to reflect work NOAA has been doing for several years.

## Program Evaluation

NOAA's programs are routinely evaluated by a variety of outside reviewers. The NOAA Science Advisory Board, made up completely of private sector, university, and other federal agency scientists, provides input on climate and air quality research. NOAA's Office of Global Programs, funded in OAR's Climate and Global Change research line item, receives review from international science agencies, universities, and private sector scientists, as well as the National Research Council and the National Science Foundation. The NOAA Research Laboratories are reviewed on a regular basis. The Sea Grant Colleges are visited at least every two years by a review panel.

## Cross-cutting Activities

### *Intra-Department of Commerce*

In partnership with the Technology Administration and the International Trade Administration within the Department of Commerce, other federal agencies, the private sector, and academia, NOAA is providing the foundation the U.S. will depend upon to lead new emerging global industries in economically and environmentally sustainable ways.

### *Government/Private Sector*

NOAA depends strongly on universities to help accomplish its science objectives through a network of joint and cooperative institutes and universities.

NOAA also funds academic researchers through competitive, peer-reviewed programs, including the Global Climate Change Program.

## External Factors and Mitigation Strategies

The science of climate change crosses generations and has progressed as a result of evolving technology. NOAA's ability to measure performance is contingent upon many external factors, including the advancement of climate change itself. While the time frame of these processes spans decades and even centuries, the reporting periods extend over years.

Improving NOAA's understanding of the natural environment requires advanced infrastructure and therefore continual investment in new technology, such as supercomputers and environmental satellites.

# Performance Goal 7: Promote Safe Navigation

## Corresponding Strategic Goal

Strategic Goal 3: Observe and manage the Earth’s environment to promote sustainable growth.

## Rationale for Performance Goal

The National Oceanic and Atmospheric Administration (NOAA) serves commercial and recreational mariners around the U.S. by providing these customers with nautical charts, tides and currents data, and geographic positioning data for safe navigation. Geodetic services are vital to the mapping and surveying industry nationwide because they provide integrity to geographic coordinates obtained from Global Positioning Satellite (GPS) system signals for accurate positioning in support of numerous applications, including land surveying, navigation, mapping, and infrastructure development such as 911 emergency response and scientific applications. Shoreline data and real-time tides and currents information also serve the coastal resource management and oil spill and disaster response communities. NOAA continues to explore innovative ways to modernize its services in a cost-efficient manner to meet customer needs.

### Measure 7a: Hydrographic Survey Backlog (Square Nautical Miles) for Critical Navigation Areas (Cumulative Percentage)

	FY 1999	FY 2000	FY 2001	FY 2002	FY 2003	FY 2004
Target	20.7%	24.3%	27.8%	35.0%	37.9%	44.5%
Actual	20.7%	24.3%	31.2%	34.3%		
Met/Not Met	Met	Met	Met	Not Met		

## Explanation of Measure

NOAA conducts hydrographic surveys to determine the depths and configurations of the bottoms of water bodies, especially of those that pertain to navigation. This includes the detection, location, and identification of wrecks, primarily through the use of side scan and multibeam sonar technology and GPS. This information is critically important to the production of both paper and electronic navigational charts for safe and efficient navigation. In addition to the commercial shipping industry, other user communities that benefit include recreational boaters, the commercial fishing industry, port authorities, coastal zone managers, and disaster response planners. Ships traversing U.S. coastal waters rely on charts based on sounding data that are more than fifty years old in many places. In 1994, NOAA identified 43,000 square nautical miles of seafloor in U.S. waters in critical need of resurvey, with more than half of this area in Alaskan waters. Many of these high-priority areas carry heavy commercial traffic, are less than thirty meters deep, and are changing constantly. NOAA’s surveying activities balance in-house resources with contracts and use the latest full bottom coverage sounding technologies to eliminate the remaining critical area backlog of approximately 28,250 square nautical miles (end of FY 2002) in the U.S.’s ports, harbors, and other coastal areas. NOAA’s hydrographic fleet supporting in-house surveying capabilities consists of the Whiting, the Rude, and the Rainier. The National Ocean Service will coordinate acquisition and processing of hydrographic surveys both in-house and through contracts.

The percentage increase reflects an exceptional 2001 field season for hydrographic data collection by NOAA ship Rainier. Because variables such as weather, mechanical failure, and level of surveying difficulty are not constant for NOAA or its contractors, this increase may not be repeated or predicted in a given year. For example, in 2001, the survey areas completed in Alaska by both Rainier and contractors were very deep, allowing for wide-spaced survey lines without difficult shoreline and shallow area investigation, which takes additional time to complete.

<b>Measure 7b: Percentage of National Spatial Reference System (NSRS) Completed (Cumulative %)</b>						
	<b>FY 1999</b>	<b>FY 2000</b>	<b>FY 2001</b>	<b>FY 2002</b>	<b>FY 2003</b>	<b>FY 2004</b>
Target	59	64	75	78	84	86
Actual	59	71	75	81		
Met/Not Met	Met	Met	Met	Met		

### Explanation of Measure

This measure was added in FY 2000 to replace the Physical Oceanographic Real Time System measure, which was discontinued due to lack of funding increases in 1999 and 2000. The NSRS performance measure is effective because it integrates the different components of the geodesy program (spatial earth measurements) into a product more useful to customers rather than measuring individual components of horizontal and vertical positioning.

In order to meet the U.S.'s navigation and other positioning needs, NOAA is enhancing the NSRS to provide the higher accuracy and accessibility needed for use with the space-based GGPS, whose satellites transmit signals that allow determination of position, height, velocity, and time. The NSRS, a system of reference stations and monuments across the U.S., provides integrity to geographic coordinates obtained from GPS satellite signals for accurate positioning in support of numerous applications, including land surveying, navigation, mapping, and infrastructure development such as 911 emergency response and scientific applications. New uses for GPS are being found every day, and many of them involve precision heights.

### Program Evaluation

NOAA's goal to promote safe navigation is evaluated at a variety of levels, from peer reviews of products, papers, and projects, to internal and external reviews of entire programs and quarterly reviews of NOAA's overall performance in navigation products and services. Constituent input is an important part of the evaluation process and is solicited regularly through constituent workshops.

From 1992 to 1996, a number of National Research Council Marine Board studies examined the nautical charting program and its transition into the digital era. NOAA incorporated study recommendations on areas such as reducing the survey backlog, implementing new digital production techniques, and delivering new electronic chart products to the program. The Hydrographic Services Improvements Act of 1998 provided Congress and NOAA an opportunity to evaluate NOAA's capabilities for acquisition and dissemination of hydrographic data, develop standards and formats for hydrographic services, and contract for the acquisition of hydrographic data. NOAA now contracts out over 50 percent of its annual critical area hydrographic survey requirements while maintaining federal competence and expertise with existing and developing surveying technologies. A 2001 KPMG Consulting cost analysis of survey platform options supported NOAA's concept of a time charter for continuous survey operations. Pending FY 2003 appropriations, NOAA plans to contract for a time charter to test its effectiveness in real-world applications.

In 1998, Congress authorized the Height Modernization study to evaluate the technical, financial, legal, and economic aspects of modernizing the national height system with GPS. The study demonstrated the significant benefits to the U.S. in terms of dollars and lives saved associated with GPS technology, and it led to current development of the vertical component of the NSRS. In 1999 NOAA completed an assessment of its tidal currents program to develop guidelines for future current surveys to update U.S. reference stations for the Tidal Current Tables. Finally, the September 1999 Report to Congress that assessed the U.S. Marine Transportation System (MTS) further articulated the need for coordinated federal leadership to achieve the MTS vision of becoming the world's most technologically advanced, safe, efficient, globally competitive, and environmentally responsible system for moving goods and people. NOAA's navigation safety support functions underwent substantial review to identify opportunities for greater integration among federal agencies.

## Cross-cutting Activities

### *Intra-Department of Commerce*

In partnership with the Technology Administration and National Telecommunications and Information Administration within the Department of Commerce and other civil agencies from all civil departments, NOAA participates on the Interagency GPS Executive Board, which with the Department of Defense jointly manages the GPS satellite program as a national asset. Now a dual-use system heavily employed by civilian and commercial sectors, GPS is a global information utility that the U.S. has committed to provide free to the world for use as the international standard for navigation, positioning, and timing.

### *Other Government Agencies*

NOAA works closely with agencies such as the Department of Transportation, the U.S. Coast Guard, and the U.S. Army Corps of Engineers in support of Marine Transportation System goals and objectives to identify and improve navigation services for maritime commerce while preserving navigation and environmental safety. NOAA and the Department of Transportation also cooperate on the development of the Nationwide Differential GPS System, which employs NOAA's Continuously Operating Reference Stations to enable highly accurate GPS positioning in three dimensions across the U.S. This system benefits from a multipurpose cooperative effort among government, academia, and the commercial sector and supports numerous NOAA objectives and activities.

## External Factors and Mitigation Strategies

Weather has a significant impact on the promotion of safe navigation activities. Both in-house and contract hydrographic survey schedules can be affected by adverse weather conditions (storms, winds, and high seas) and equipment failure, as can aerial photography flights scheduled for shoreline photogrammetry. Storm damage frequently renders water-level stations inoperable, affecting surveying capabilities and real-time observations of water levels and currents so critical to safe navigation. Natural disasters such as earthquakes and hurricanes can elevate the critical priority of an area because of shoreline changes or obstruction accumulation; man-made impacts such as shifts in shipping patterns, newly regulated shipping lanes, port expansions, or wrecks will also increase NOAA's designated critical areas. NOAA also receives requests to survey areas not identified as critical. For example, ship groundings frequently prompt requests from the U.S. Coast Guard and others to survey noncritical areas, diverting efforts away from the survey schedule. Finally, in addition to mission activities, NOAA ships and aircraft provide immediate response capabilities for unpredictable events such as recovery and search efforts after the TWA Flight 800 and EgyptAir Flight 990 crashes; damage assessments after major oil spills such as the Exxon Valdez, the Persian Gulf War, and the New Carissa; and severe hurricanes. NOAA mitigates the impacts of weather, disaster events, and equipment malfunction with backup plans for relocating assets to other projects, or by reassessing schedules for other windows of opportunity.

## NOAA Data Validation and Verification

NOAA's Office of Finance Administration/Budget Office coordinates an annual review of the performance data to ensure that it is complete and accurate. During this process, significant deviations from projected targets, if any, are discussed with the appropriate NOAA line office so that changes or corrections can be made to help meet NOAA's performance goals. The actual validation process is conducted by individual NOAA line offices. The verification aspects depend on the individual line office. For oceans and fisheries related measures, stock assessments and reviews (internal, and/or peer) are common. For weather-related measures, the verification process is, among other things, through comparison of predicted weather to the actual event. For the climate-related measures, verification is through, among other things, quality control of data. Satellite data are compared with on-site data to help validate data accuracy. The NOAA Data Validation and Verification table can be found starting on the following page.

**NOAA Data Validation and Verification**

Performance Measure	Data Source	Frequency	Data Storage	Verification	Data Limitations	Actions to be Taken
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**Measure 1a:** NOAA's National Marine Fisheries Service (NMFS) report to Congress, *Status of Fisheries of the United States*.

Number of overfished major stocks of fish

Annual

NMFS Office of Sustainable Fisheries.

Stock assessments and peer reviews (internal and outside the agency).

None

None

**Measure 1b:** Number of major stocks with an "unknown" stock status

Annual

NMFS's Habitat Office will collect quality-controlled data to ensure performance data criteria are being met.

None

None

**Measure 2a:** Number of acres of coastal habitat benefited (cumulative)

Annual

NMFS's Habitat Office will collect information, conduct assessments, and store additional input data.

None

None

**Measure 2b:** Reducing the impacts of invasive species within six regions in the United States

Annual

OAR will collect data, conduct assessments, and store data.

Original research data verified through peer review; OAR will obtain quality-controlled data from other sources to ensure criteria are being met for inclusion in performance calculations.

Reaching these targets depends on activities of other federal and state agencies with management responsibilities in this area.

None

None

**Measure 2c:** Percentage of U.S. shoreline and inland areas that have improved ability to reduce coastal hazard impacts

Annual

NOS will collect information, conduct assessments, and store data.

All data used in coastal hazard risk assessments are quality controlled; risk assessment models are tested for accuracy and coverage (amount of shoreline covered).

This measure tracks development and implementation of coastal hazard risk atlases as an indicator of improved ability to identify the extent and severity of coastal hazards. Reaching these targets will depend on the activities of other federal and state agencies with management responsibilities in this area.

None

**Measure 3a:** Increase in number of threatened species with lowered risk of extinction

Annual

NMFS's Office of Protected Resources.

Audits and internal peer review within NOAA and external peer review by regional fishery councils, the National Science Foundation, the National Academy of Science, and other organizations.

None

None

**Measure 3b:** Number of commercial fisheries that have insignificant marine mammal mortality

Annual

NMFS's Office of Protected Resources.

Audits and internal peer review within NOAA and external peer review by regional fishery councils, the National Science Foundation, the National Academy of Science, and other organizations.

None

**Measure 3c:** Increase in number of endangered species with lowered risk of extinction

Annual

NMFS's Office of Protected Resources.

Audits and internal peer review within NOAA and external peer review by regional fishery councils, the National Science Foundation, the National Academy of Science, and other organizations.

None

None

**NOAA Data Validation and Verification**

Performance Measure	Data Source	Frequency	Data Storage	Verification	Data Limitations	Actions to be Taken
<p><b>Measure 4a:</b> Lead time (minutes), accuracy (%), and false alarm rate (FAR, %) of severe weather warnings for tornadoes</p> <p><b>Measure 4b:</b> Lead Time (Minutes) and Accuracy (%) for Severe Weather Warnings for Flash Floods</p>	National Weather Service (NWS) field offices.	Monthly	NWS headquarters and the Office of Climate, Water, and Weather Services (OCWWS).	Verification is the process of comparing the predicted weather to the actual event. The process begins with the collection of warnings from every NWS office across the nation. The severe weather event program includes extensive quality control procedures to ensure the highest reliability of each report. The data in each report are entered into a database that contains severe weather warnings where the warnings and events are matched and appropriate statistics are calculated and made available to all echelons of the NWS.	There are limitations of scientific verification in assessing data. The fundamental purpose of scientific verification is to objectively assess program performance through the use of standard statistical analysis. However, a number of factors unique to the atmospheric sciences must be considered to ensure proper interpretation of objectively derived statistics. The primary factor to consider is the natural variation of this performance measure related to annual fluctuations in meteorological conditions associated with severe weather.	Review the storm data from individual events to pinpoint the causes and take corrective actions (tornadoes).  NOAA will continue to collect data while reporting additional measures in the future (flashfloods).
<p><b>Measure 4c:</b> Hurricane forecast track error (48 hours)</p>	PNWS/Tropical Prediction Center (TPC).	Annual	TPC	Hurricane storm verification is performed for hurricanes, tropical storms, and tropical depressions regardless of whether these systems are over land or water. The TPC issues track and intensity forecast throughout the life of a hurricane. The actual track and intensity are verified through surface and aircraft measurements. NOAA calculates the average accuracy of the TPC track and intensity forecasts for the Atlantic basin at the end of each hurricane season.	Verification of actual track and intensity versus forecast is very accurate. However, actual annual scores vary up to 20% in some years due to the type and location of the hurricane events. Some types of systems can be more accurate forecasted than others. For example, hurricanes that begin in the northern sections of the hurricane formation zone tend to be much harder to accurately forecast. Out-year measures depend on a stable funding profile and take into account improved use of the Weather Service Radar (WSR-88D), new satellites, improved forecast models, new and continued research activities of the U.S. Weather Research Program (USWRP), and investments in critical observing systems.	NOAA will report on the tracking of forecasts at 24, 48, and 72-hour intervals.
<p><b>Measure 4d:</b> Accuracy (%) of one-day threat score forecast of precipitation</p>	The Hydrometeorological Prediction Center.	Annual	World Weather Building.	The Hydrometeorological Prediction Center has produced the Quantitative Precipitation Forecast since the early 1960s and has kept verification statistics related to the Quantitative Precipitation Forecast program since that time. All data are examined for accuracy and quality control procedures are applied.	The NWS routinely prepares and distributes to internal and external customers predictions of heavy rainfall. The Hydrometeorological Prediction Center has the responsibility to prepare both graphical and text products depicting the areas threatened by heavy precipitation in the contiguous United States. There will be a significant amount of variability, and the improvements may not be achieved exactly as predicted. Out-year measures depend on a stable funding profile and take into account improved use of the WSR-88D, new satellites, improved forecast models, new and continued research activities of the USWRP, investments in critical observing systems, and continued support of the Advanced Weather Interactive Processing System (AWIPS).	NOAA will implement planned weather model improvements along with ongoing research projects.

**NOAA Data Validation and Verification**

Performance Measure	Data Source	Frequency	Data Storage	Verification	Data Limitations	Actions to be Taken
<b>Measure 4e:</b> Lead time (hours) and accuracy (%) of winter storm warnings	NWS field offices.	Daily	NWS headquarters and OCWWS.	Verification is the process of comparing the predicted weather with the actual event. The process begins with the collection of forecasts and observations from each NWS office across the nation. The quality-controlled, collated data are transmitted to the National Centers for Environmental Prediction in Camp Springs, Maryland, where the data are stored as computer files. The data files are retrieved by the NWS headquarters' Office of Science and Technology. Following additional quality control the data are stored on an Office of Science and Technology workstation and used to generate semi-annual statistics on forecast accuracy.	Documentation for heavy snowfall is printed annually. Due to the relatively few number of cases each year, the projections assume a three-year average (current plus two previous years, all equally weighted). Due to the large volume of data gathered and computed, a document for lead time and accuracy of winter storm warnings cannot be finalized until well into the following fiscal year. Out-year measures depend on a stable funding profile and take into account improved use of the WSR-88D, new satellites, improved forecast models, new and continued research activities of the USWRP investments in critical observing systems, and continued support of AWIPS.	Introduce high-resolution regional models.
<b>Measure 4f:</b> Accuracy (%) and FAR (%) of forecasts of ceiling and visibility (aviation forecasts)	NWS field offices.	Daily	NWS headquarters and OCWWS.	Verification is the process of comparing the predicted weather with the actual event. The process begins with the collection of forecasts and observations from each NWS office across the nation. The quality-controlled, collated data are transmitted to the National Centers for Environmental Prediction in Camp Springs, Maryland, where the data are stored as computer files. The data files are retrieved by the NWS headquarters' Office of Science and Technology. Following additional quality control the data are stored on an Office of Science and Technology workstation and used to generate semi-annual statistics on forecast accuracy.	Due to the large volume of data gathered and computed, documentation for this measure cannot be finalized until well into the following fiscal year. Out-year measures depend on a stable funding profile and take into account improved use of the WSR-88D, new satellites, improved forecast models, new and continued research activities of the USWRP investments in critical observing systems, and implementation of AWIPS.	NOAA will improve and expand its training program and work with the National Aeronautics and Space Administration and the Federal Aviation Administration to develop new software tools and forecast techniques.
<b>Measure 4g:</b> Accuracy (%) of forecast for wind speed and wave height (marine forecasts)	NWS field offices.	Daily	The NWS and the National Centers for Environmental Prediction's Ocean Modeling Branch.	Verification is the process of comparing the predicted weather with the actual event. The process begins with the collection of forecasts and observations from each NWS office across the nation. The quality-controlled, collated data are transmitted to the National Centers for Environmental Prediction, where they are stored as computer files. The data files are retrieved by the NWS, and the National Centers for Environmental Prediction's Ocean Modeling Branch. Following additional quality control the data are used to generate quarterly statistics on forecast accuracy.	Due to the large volume of data gathered and computed, documentation for the accuracy of forecast for wind and waves cannot be finalized until well into the following fiscal year. Out-year measures depend on a stable funding profile and take into account improved use of the WSR-88D, new satellites, improved forecast models, new and continued research activities of the USWRP investments in critical observing systems, and implementation of AWIPS.	NOAA will deploy enhanced versions of AWIPS (Build-5), implement new wave forecast models, and improve communication and dissemination techniques to marine users.

**NOAA Data Validation and Verification**

Performance Measure	Data Source	Frequency	Data Storage	Verification	Data Limitations	Actions to be Taken
<p><b>Measure 5a:</b> Determine the accuracy of the correlation between forecasts of the southern oscillation index (SOI) and El Niño/La Niña events</p>	<p>Forecasts of sea surface temperature in a portion of the Pacific Ocean and observations from buoys, ships, and satellites.</p>	<p>Annual</p>	<p>The National Weather Service's (NWS's) National Centers for Environmental Prediction.</p>	<p>NOAA quality controls the incoming data (for example, through error checking and interstation comparison) and compares the satellite data with on site data to help validate data accuracy.</p>	<p>This measure assesses the correlation between forecasts of sea surface temperature (based on models) and actual sea surface temperature (based on satellite and on site observations). Improvements in forecasting ability depend upon improved observations, models, and research. Forecasts will likely be more accurate in El Niño years than in non-El Niño years.</p>	<p>None</p>
<p><b>Measure 5b:</b> U.S. temperature forecasts (skill score)</p>	<p>Forecast data observations from U.S. Weather Forecast Offices, and from a cooperative network maintained by volunteers across the nation.</p>	<p>Annual</p>	<p>NWS's National Centers for Environmental Prediction.</p>	<p>NOAA performs quality assurance analysis of the data (for example, error checking, elimination of duplicates, and interstation comparison) both at the national and U.S. Weather Forecast Office level.</p>	<p>Given the difficulty of making advance temperature and precipitation forecasts for specific locations, a skill score of 20 is considered quite good and means the forecast was correct in almost 50% of the locations forecasted. Forecasts will likely be better in El Niño years than in non-El Niño years.</p>	<p>None</p>
<p><b>Measure 5c:</b> Number of new monitoring or forecast products that become operational per year (cumulative)</p>	<p>NWS's Climate Prediction Center and National Environmental Satellite, Data, and Information Service's (NESDIS's) National Climatic Data Center (NCDC).</p>	<p>Annual</p>	<p>NCDC</p>	<p>Products are reported to NOAA management at quarterly reviews.</p>	<p>The new products are a response to increasing customer demands for expanded NOAA climate information and services. New products will be subsequently monitored for use and, in the case of forecast products, current skill and projected improvements.</p>	<p>None</p>
<p><b>Measure 5d:</b> New climate observations introduced</p>	<p>Observations from data buoys, ships, satellites, and so on.</p>	<p>Annual</p>	<p>Oceanic and Atmospheric Research laboratories, NESDIS, and NCDC.</p>	<p>NOAA performs quality assurance analysis and data processing.</p>	<p>Percentages of observing platforms operational at a given time and analyses of data quality and errors; observations received in time to be incorporated in operational climate analyses and forecasts.</p>	<p>None</p>
<p><b>Measure 6a:</b> Assess and model carbon sources and sinks throughout the United States</p>	<p>Observations from atmospheric profiling sites in North America and shipboard ocean carbon sampling.</p>	<p>Annual</p>	<p>Climate Monitoring and Diagnostics Laboratory.</p>	<p>Quality assurance and calibration against known standards performed by NOAA.</p>	<p>Number of profiling/ocean sites and our ability to incorporate these data into advanced carbon models.</p>	<p>None</p>

**NOAA Data Validation and Verification**

Performance Measure	Data Source	Frequency	Data Storage	Verification	Data Limitations	Actions to be Taken
<b>Measure 6b:</b> Assess and model carbon sources and sinks globally	Flask samples taken from a global network and analyzed by NOAA.	Annual	Climate Monitoring and Diagnostics Laboratory.	Quality assurance and calibration against known standards performed by NOAA.	Number of flask sites and our ability to incorporate these data into advanced carbon models.	None
<b>Measure 6c:</b> Determine the actual long-term changes in temperature and precipitation over the United States	NOAA's National Climatic Data Center.	Annual	NOAA's National Climatic Data Center.	Monte Carlo simulations based on operation stations.	None	None
<b>Measure 6d:</b> Results of 90% of NOAA climate research activities cited in the 2001 intergovernmental panel on climate change's third assessment of climate change	Research from NOAA, the Office of Oceanic and Atmospheric Research, and the Aeronomy laboratory.	Periodic (approximately every three to five years).	NOAA's Aeronomy Laboratory.	NOAA collects data using proven, peer-reviewed procedures. In addition, internationally qualified experts peer review the results as part of the publication process.	None	None
<b>Measure 7a</b> Hydrographic survey backlog (square nautical miles) for critical navigation areas (cumulative percentage)	Progress reports on data collected from hydrographic survey platforms.	Annual	National Ocean Service will store data and publish nautical charts.	National Ocean Service will apply established verification and validation methods.	Progress in reducing the backlog is measured against a baseline value of 43,000 square nautical miles as determined in 1994. Weather can affect scheduled surveys.	None
<b>Measure 7b:</b> Percentage of national spatial reference system (NSRS) completed (cumulative %)	The National Ocean Service and the National Geodetic Survey define and manage the NSRS, the foundation for the nation's spatial data infrastructure.	Ongoing, annual reporting.	Automated database at National Ocean Service.	National Ocean Service will apply standard verification and validation methods.	Weather conditions, security, employment, and funding issues can affect field operations. The National Geodetic Survey also works cooperatively with state organizations; accommodating partners can also impact activities to some extent.	None

